Sea Grant

Tools for Land Use Decision Makers

Chet Arnold, Univ. of CT Center for Land Use Education and Research

Sea Grant Association Meeting, October 2009

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University of Connecticut
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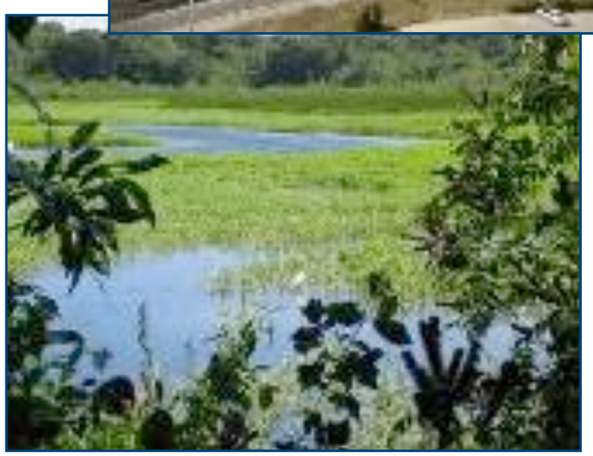

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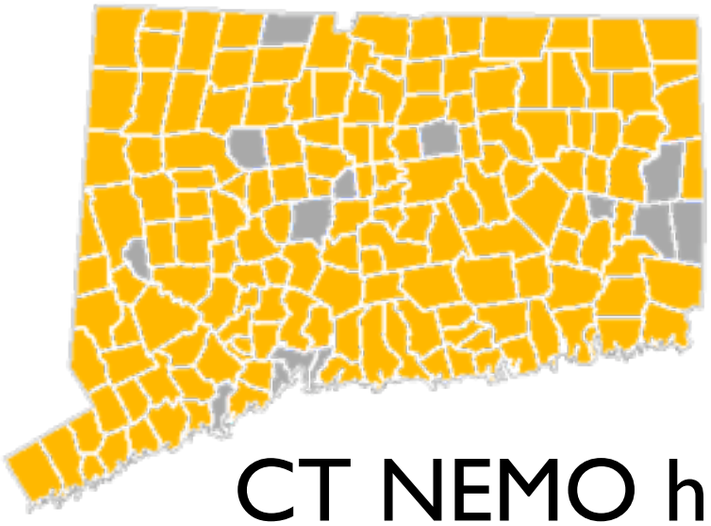
Center for Land Use Education & Research

Research, Tools & Training, Outreach

A focus on community officials



The CT NEMO Program

CT NEMO has been around since 1991
and worked with 155 of CT's 169 towns

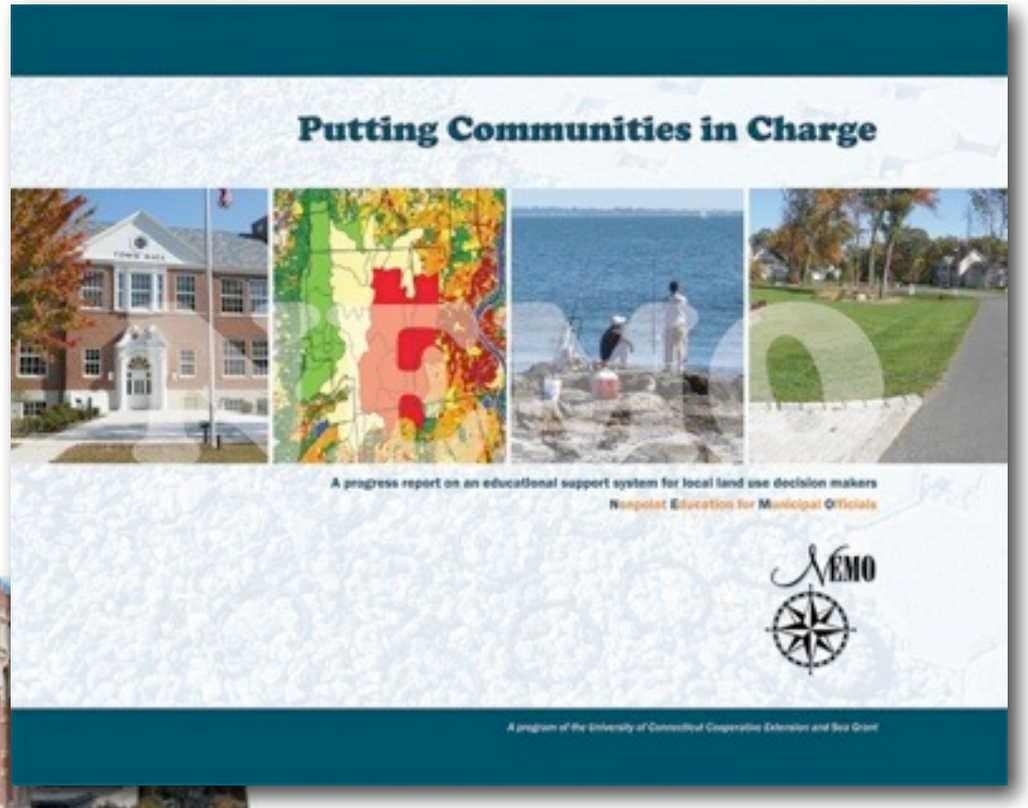
Comprehensive planning

Community resource inventories

Open space planning

Low impact development

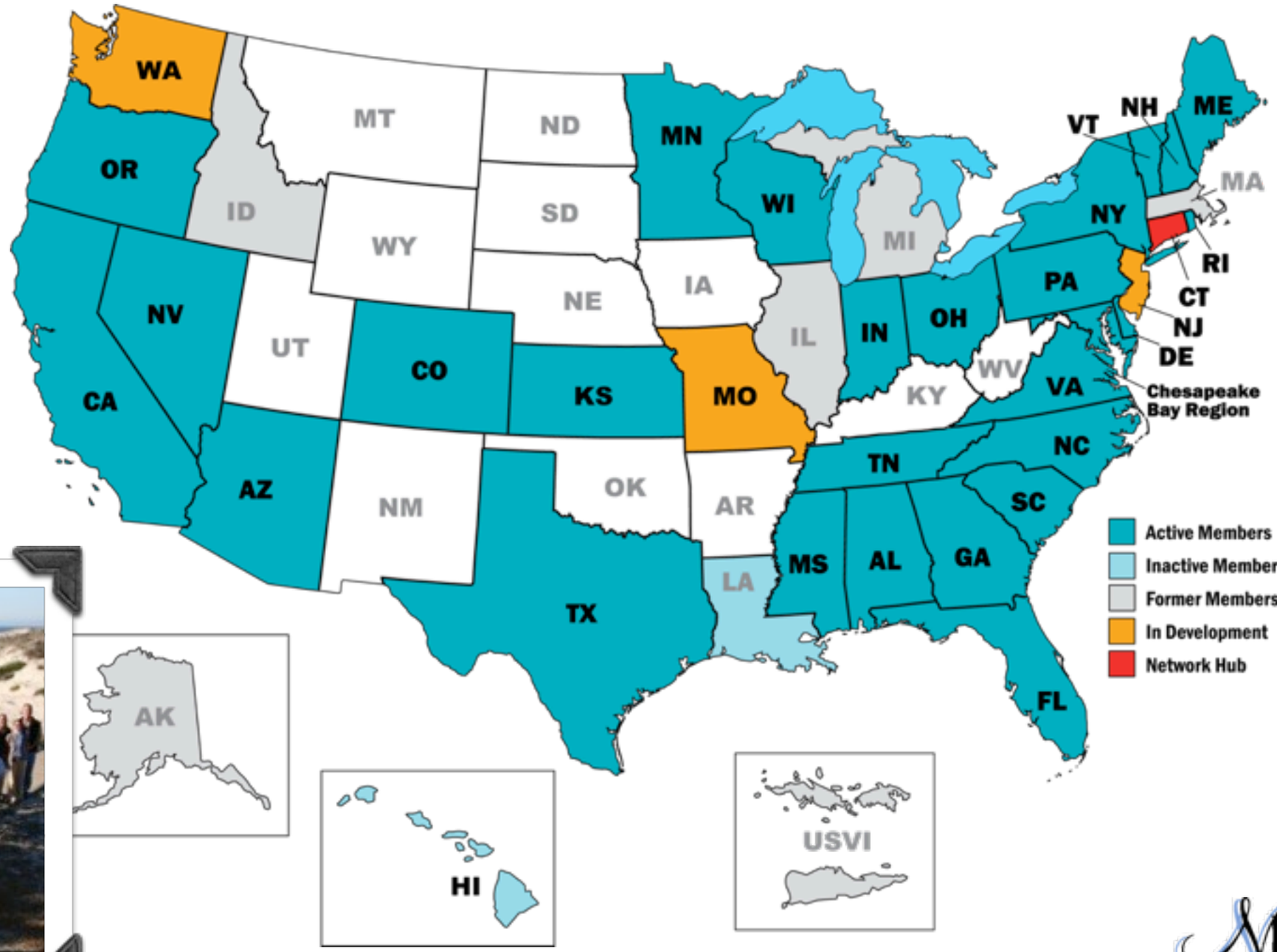
Planning for stormwater



NEMO Family Values

- **Land Use Impact on water resources is the issue**
- **Local Land Use Officials are the target audience**
- **Natural Resource Based Planning is Solution Offered**
- **Education is the Method**
- **Geospatial Data Enhances the Message**

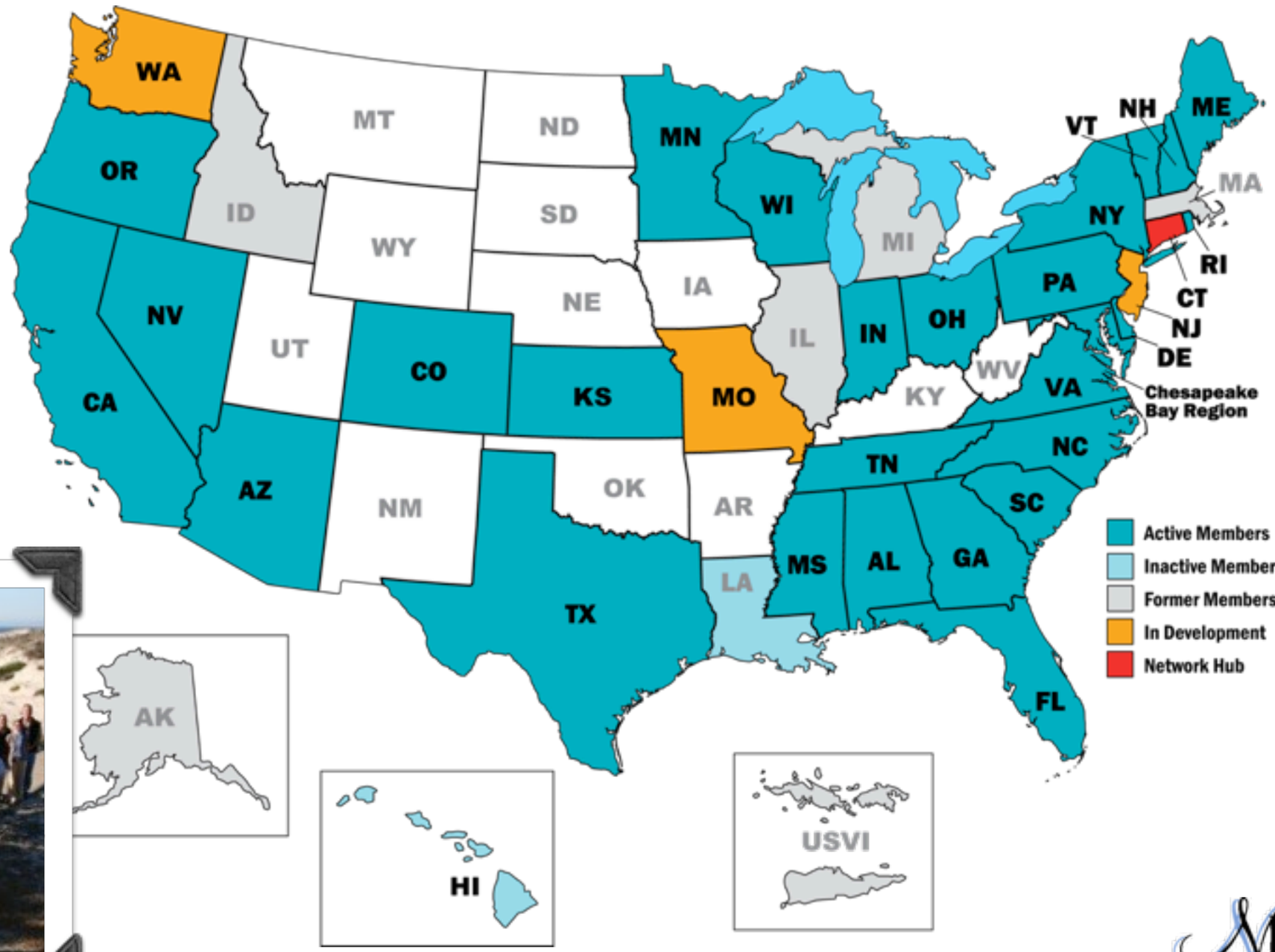
The National NEMO Network Circa 2009



NEMO National Network

The National NEMO Network Circa 2009

Sea Grant



NEMO National Network

The National NEMO Network Circa 2009

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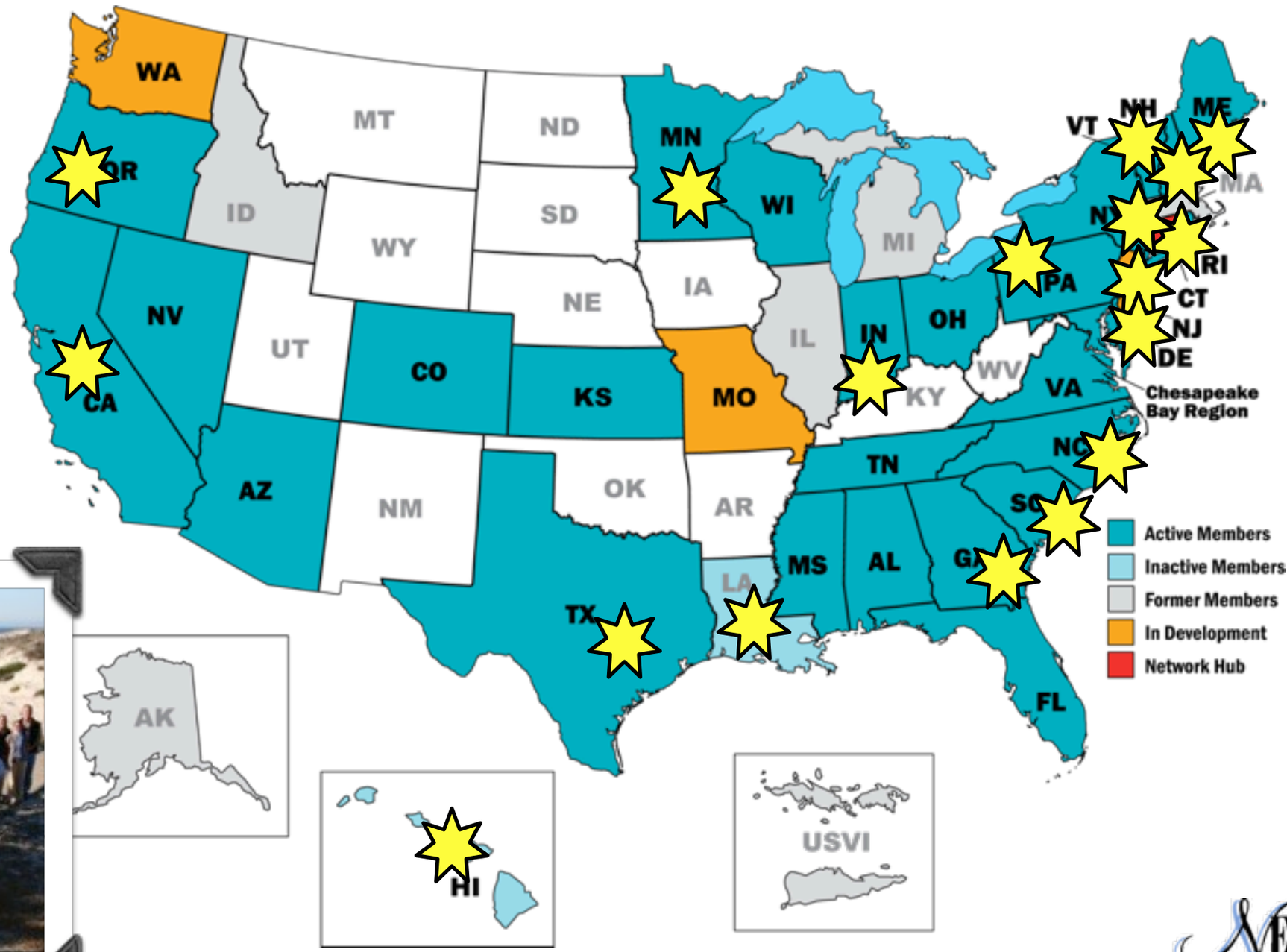
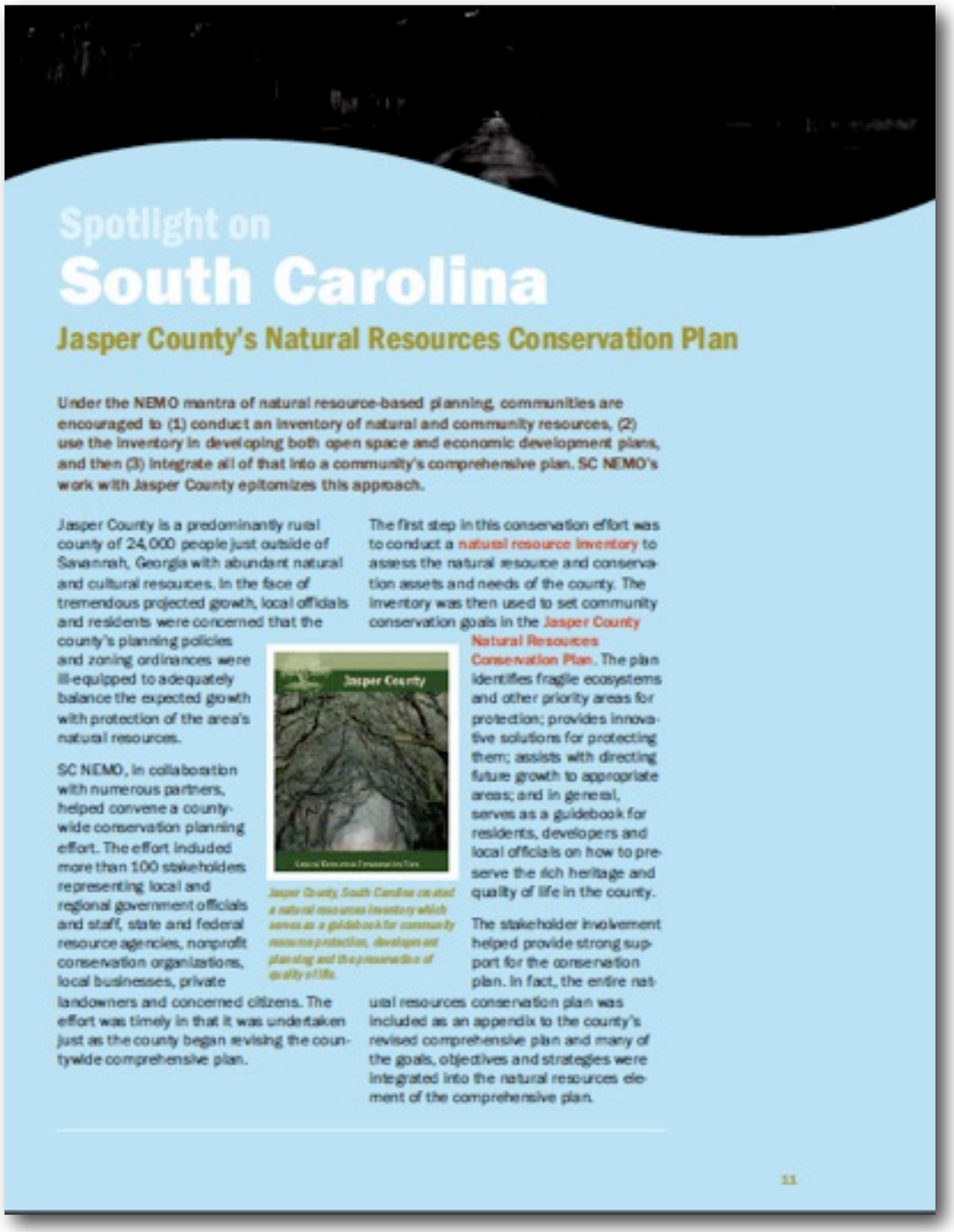


NEMO National Network

Catalyzing change at the local level

NEMO
National Network



Spotlight on
South Carolina

Jasper County's Natural Resources Conservation Plan

Under the NEMO mantra of natural resource-based planning, communities are encouraged to (1) conduct an inventory of natural and community resources, (2) use the inventory in developing both open space and economic development plans, and then (3) integrate all of that into a community's comprehensive plan. SC NEMO's work with Jasper County epitomizes this approach.

Jasper County is a predominantly rural county of 24,000 people just outside of Savannah, Georgia with abundant natural and cultural resources. In the face of tremendous projected growth, local officials and residents were concerned that the county's planning policies and zoning ordinances were ill-equipped to adequately balance the expected growth with protection of the area's natural resources.

SC NEMO, in collaboration with numerous partners, helped convene a county-wide conservation planning effort. The effort included more than 100 stakeholders representing local and regional government officials and staff, state and federal resource agencies, nonprofit conservation organizations, local businesses, private landowners and concerned citizens. The effort was timely in that it was undertaken just as the county began revising the countywide comprehensive plan.

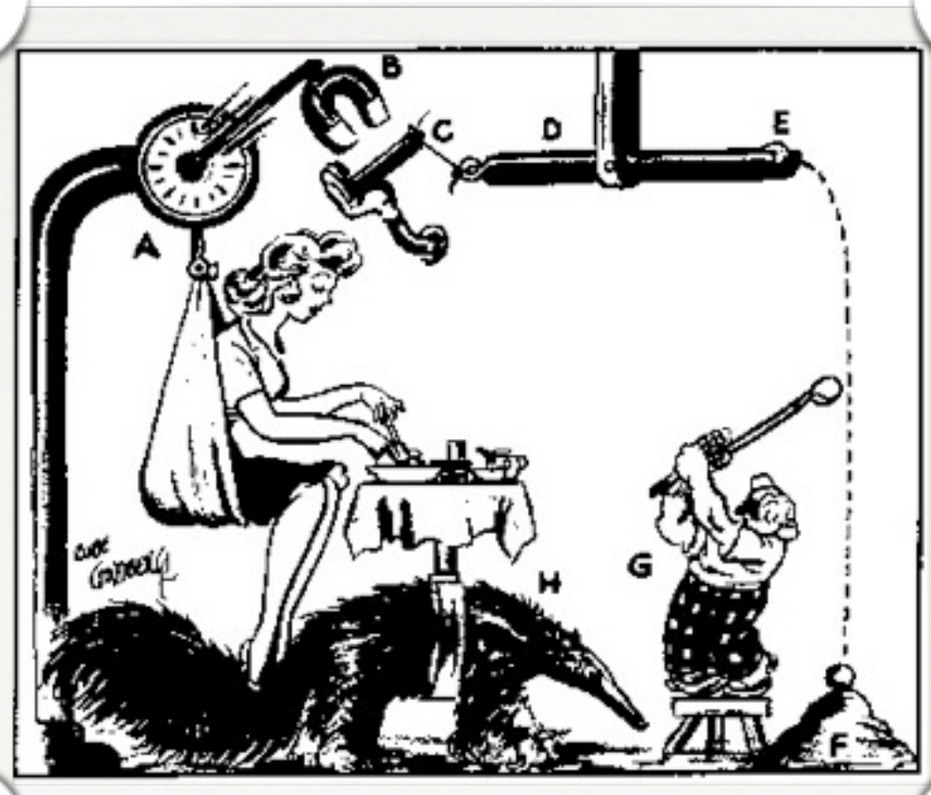
The first step in this conservation effort was to conduct a natural resource inventory to assess the natural resource and conservation assets and needs of the county. The inventory was then used to set community conservation goals in the Jasper County Natural Resources Conservation Plan. The plan identifies fragile ecosystems and other priority areas for protection; provides innovative solutions for protecting them; assists with directing future growth to appropriate areas; and in general, serves as a guidebook for residents, developers and local officials on how to preserve the rich heritage and quality of life in the county.

Jasper County, South Carolina created a natural resources inventory which serves as a guidebook for community resource protection, development planning and the preservation of quality of life.

The stakeholder involvement helped provide strong support for the conservation plan. In fact, the entire natural resources conservation plan was included as an appendix to the county's revised comprehensive plan and many of the goals, objectives and strategies were integrated into the natural resources element of the comprehensive plan.

Today's Tour de Force to include....

- Communities as the target audience
- The evolution of geospatial technologies & decision support
- Deep thoughts, with examples



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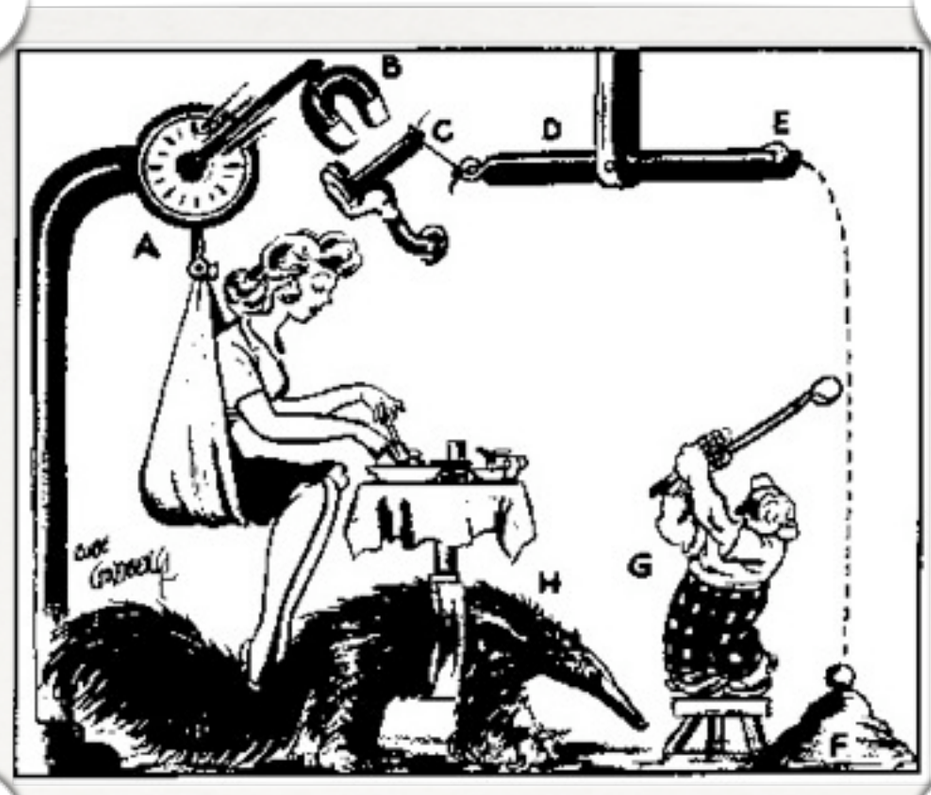
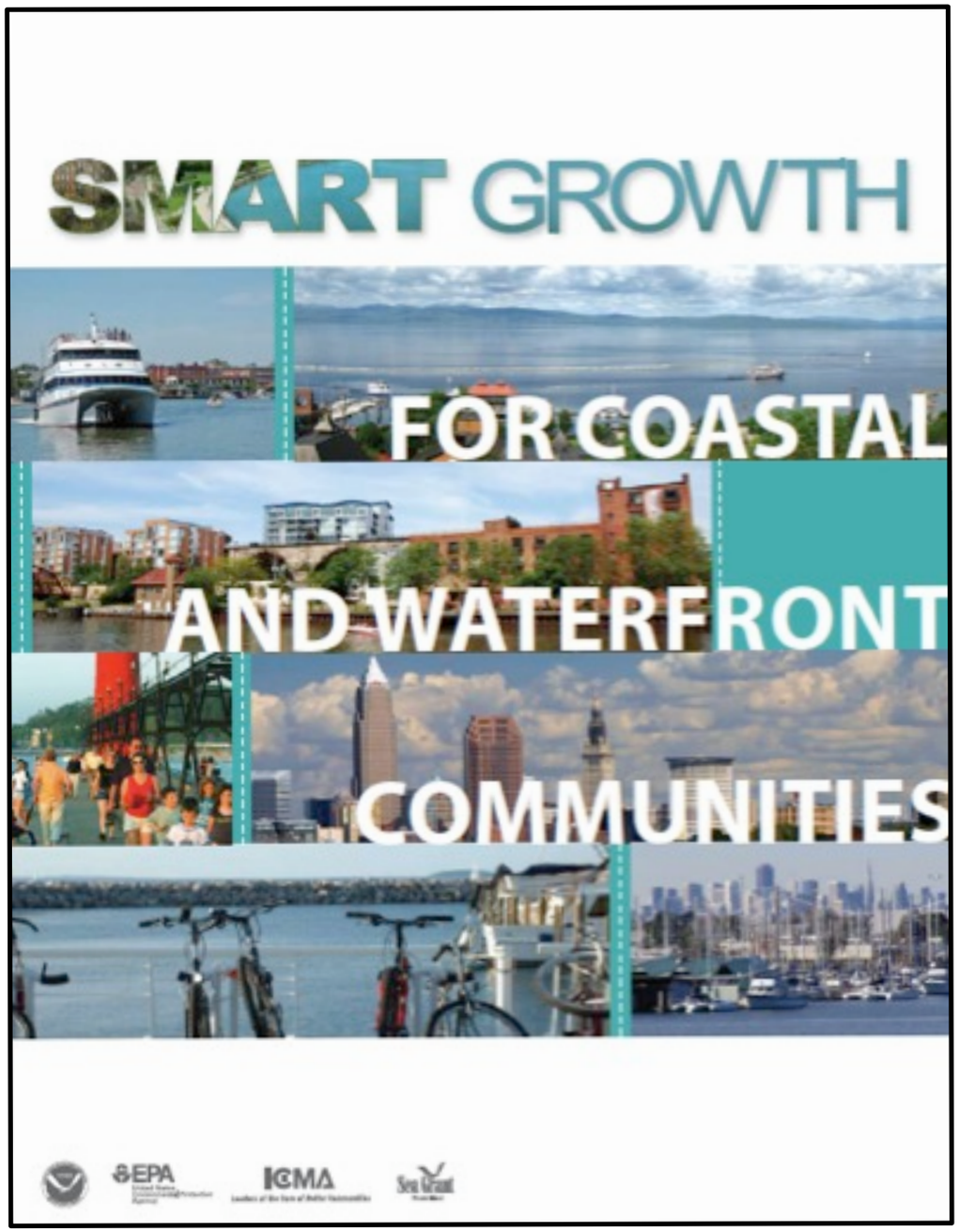


The complexity of charting a community's future

- natural resource-based planning
- green infrastructure
- low impact development
- community resiliency
- smart growth



The complexity of charting a community's future

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Table of Contents

Working with communities

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7. needs to be presented within the context of their world

The myth of The Model Reg

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- comprehensive plans
- open space plans
- economic dev. plans
- zoning regs
- subdivision regs
- road standards
- maintenance routines
- etc., etc., etc.
- etc.

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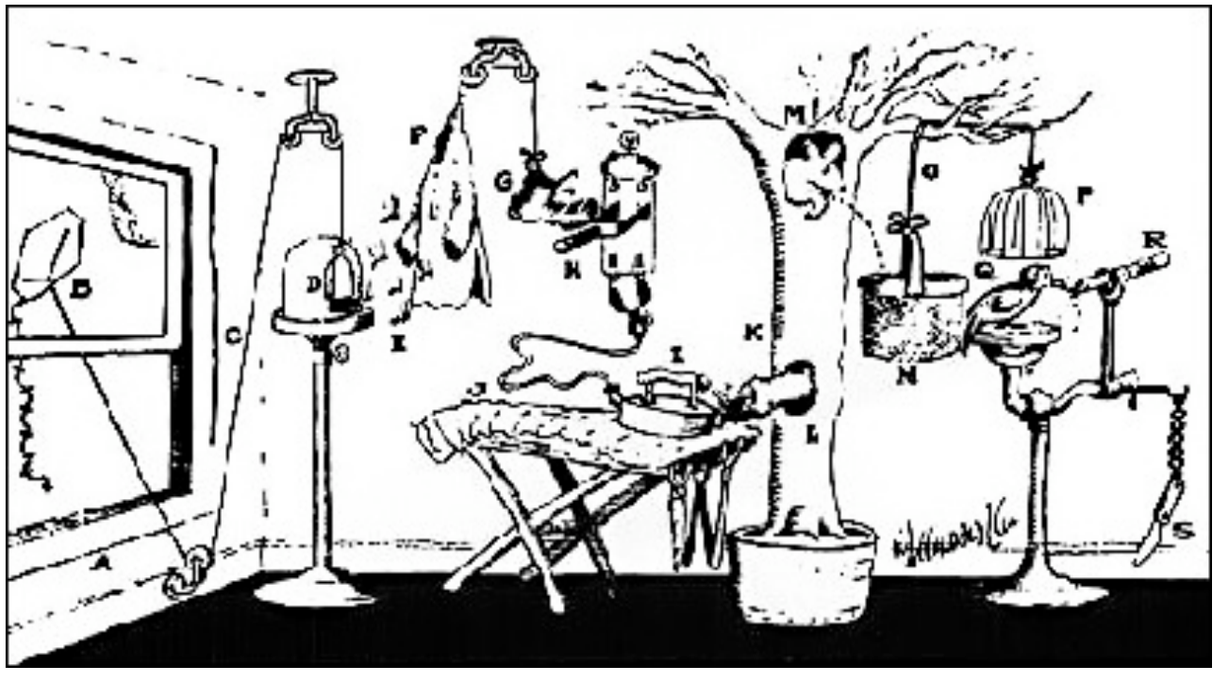
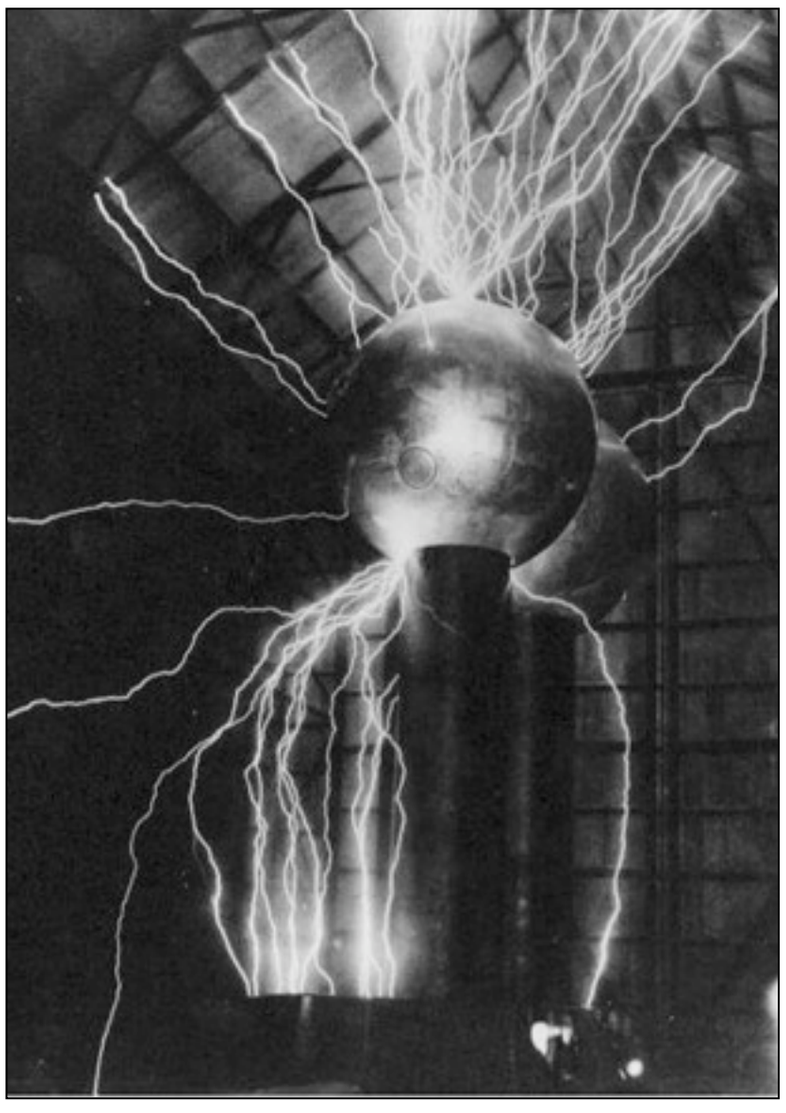


In the beginning, there was expensive, impenetrable & inaccessible GIS & RS not used by any but the largest cities



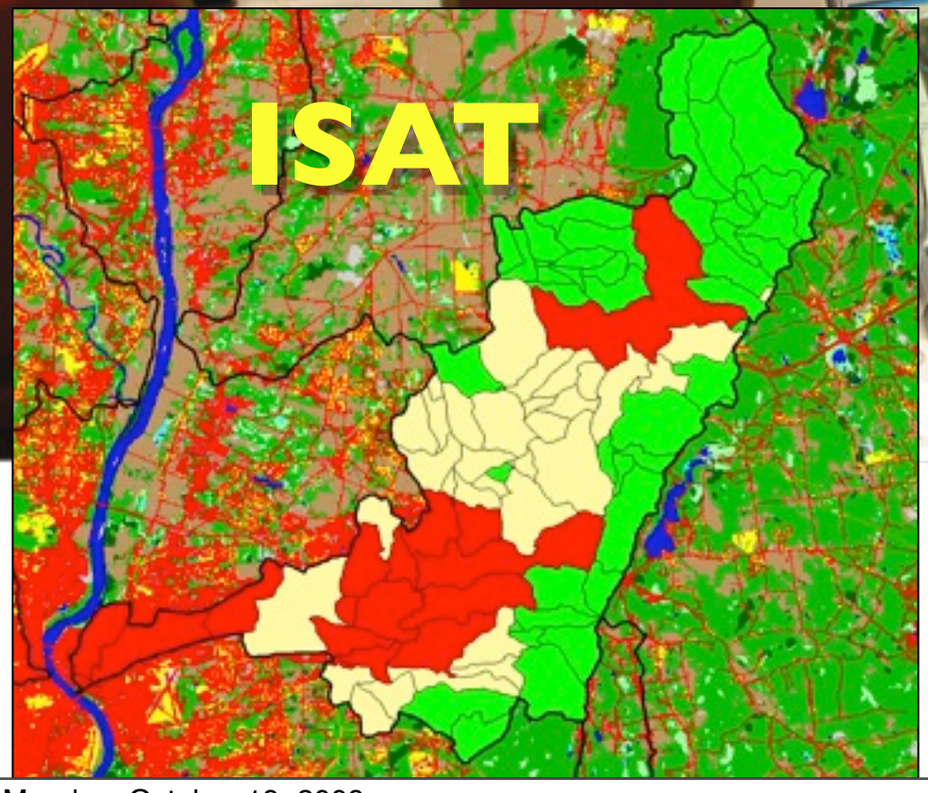
The NEMO breakthrough: geospatial maps & imagery as an educational asset & catalyst for change

Over time, geospatial technology goes PC and becomes accessible to many (but by no means all) communities

Over time, geospatial technology goes PC and becomes accessible to many (but by no means all) communities

- property tax tracking
- school bus routing
- fire and evacuation routes
- etc.

Soon, analytical geospatial tools to inform land use decision making were proliferating & becoming accessible (to some)



A small sampling of GIS-based analytical tools used by CCD & NEMO Sea Grant staff

- CommunityViz (Orton/Placeways)
- ISAT (UConn-CSC)
- N-SPECT (CSC)
- LandFrag Tool (UConn-Placeways)
- L-THIA (Purdue)
- Habitat Priority Planner (CSC)
- LEAM (UIUC)

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Assess Present

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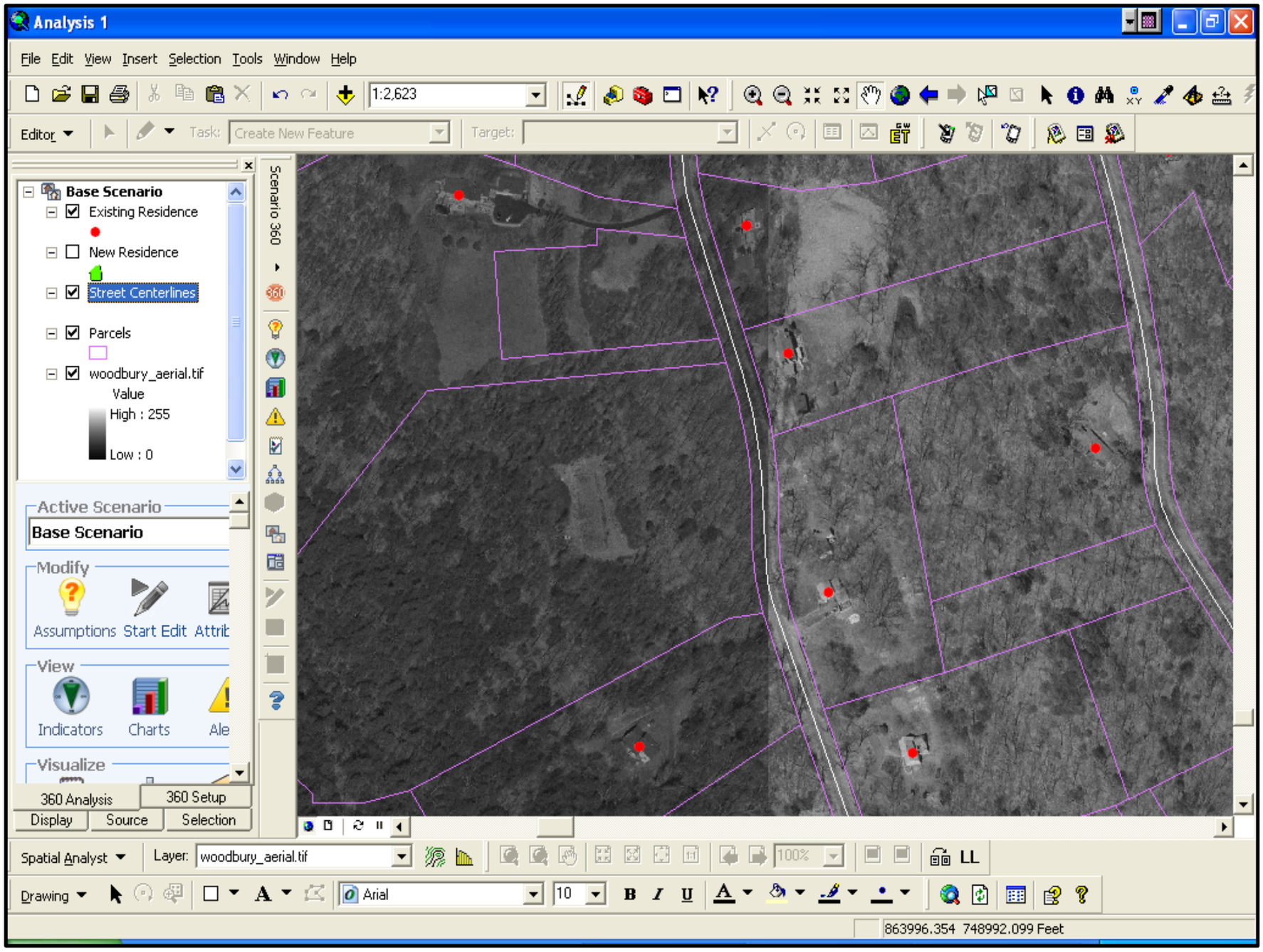
Assess Present

Explore Future

The classic "buildout" analysis: showing potential impacts of current policies



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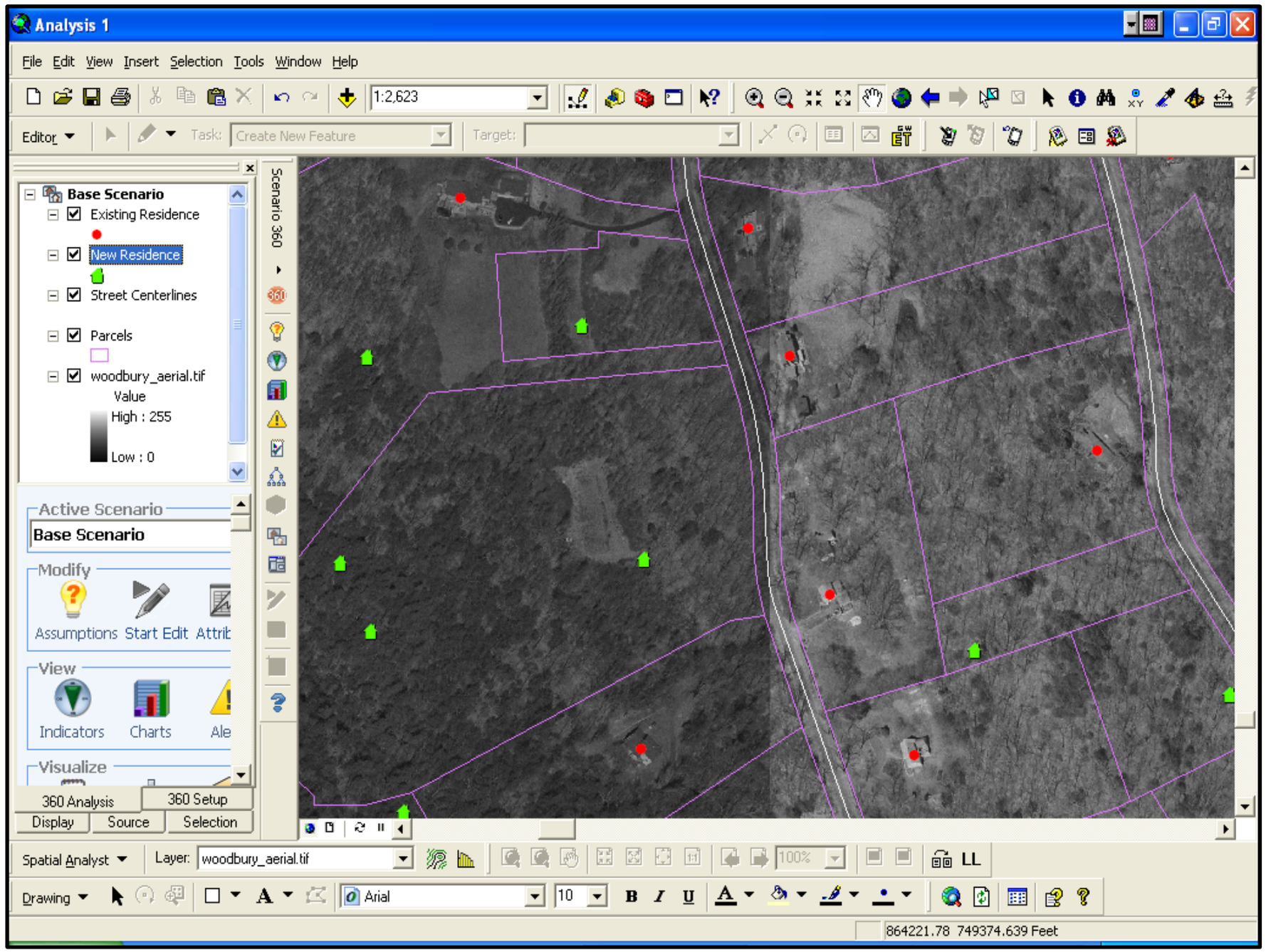

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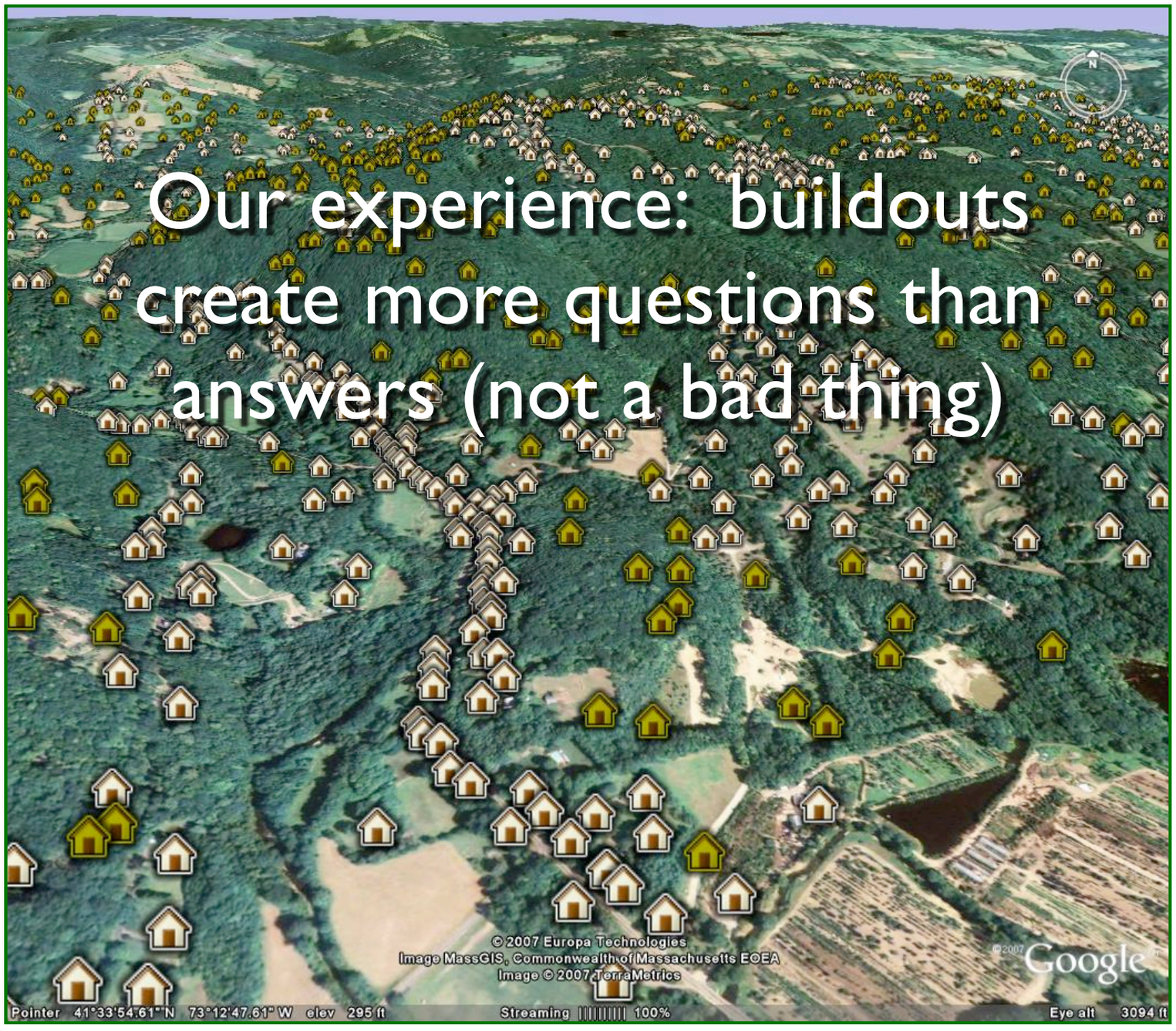
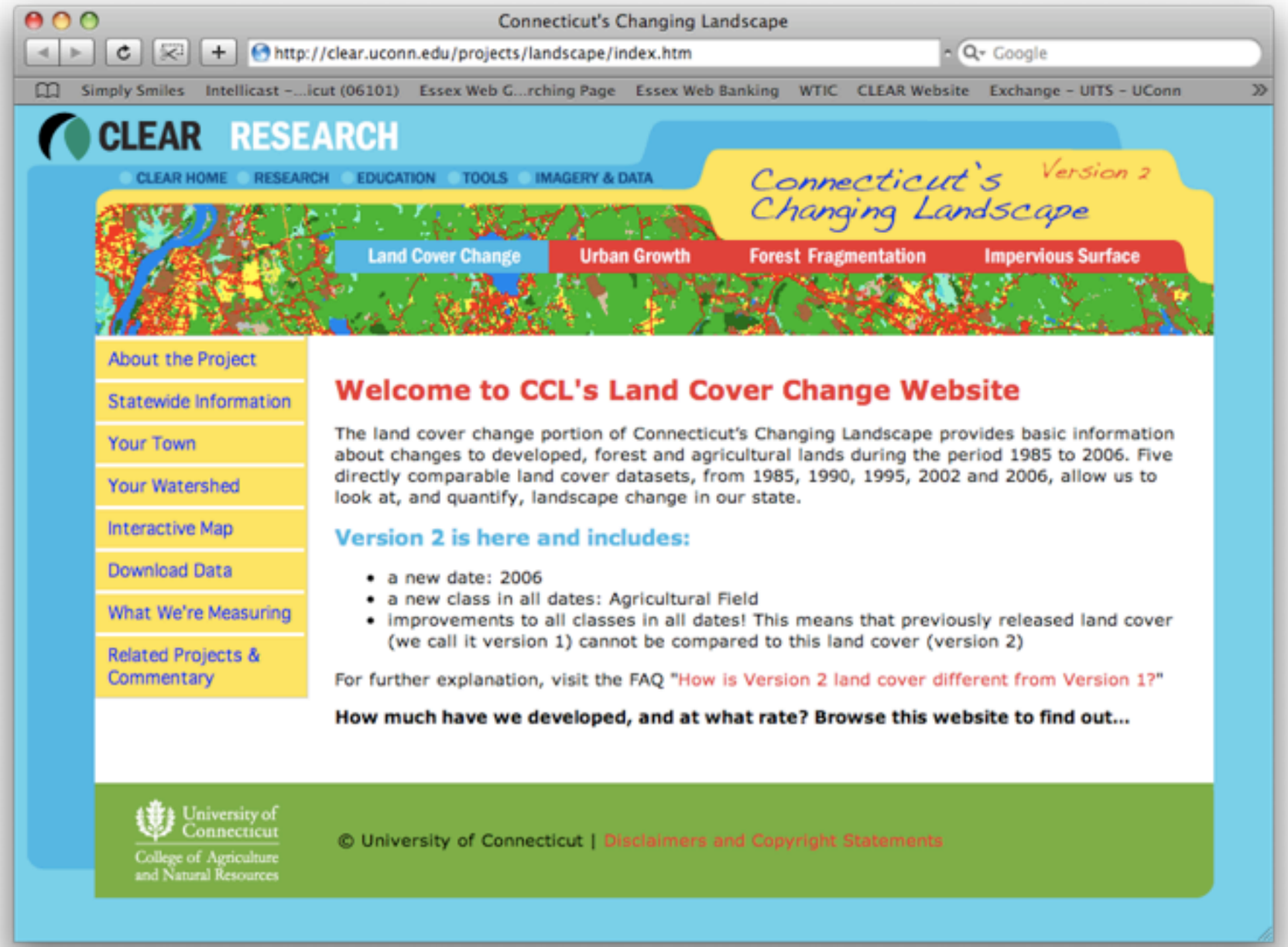


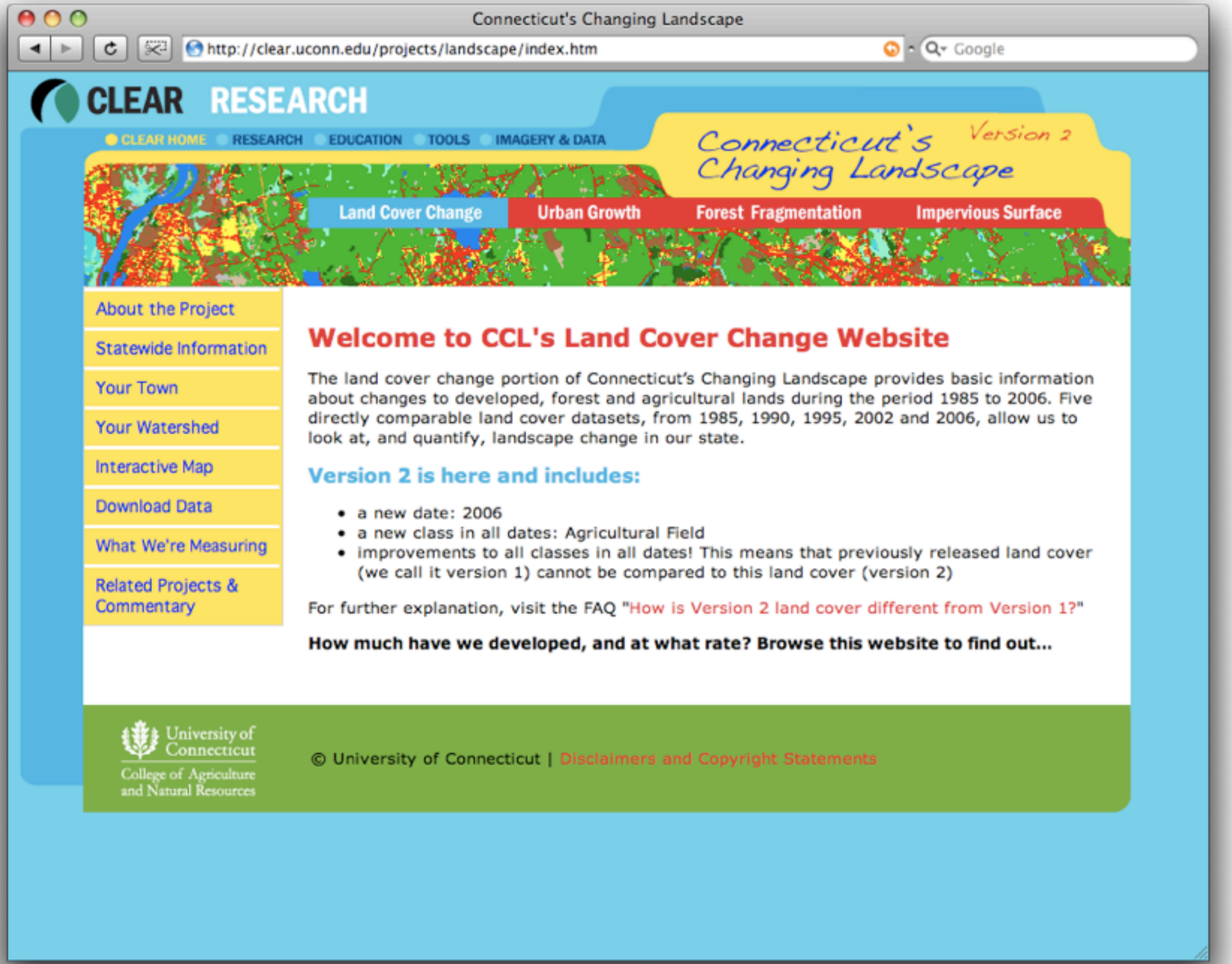
Predictive tools are not the only ones that can inform & catalyze future land use policies

- **past trends**
- **current status**

Past trends can inform present day decisions that will shape future conditions

Connecticut's Changing Landscape




Connecticut's Changing Landscape
http://clear.uconn.edu/projects/landscape/index.htm
Google
CLEAR RESEARCH
CLEAR HOME
RESEARCH
EDUCATION
TOOLS
IMAGERY & DATA
Connecticut's Changing Landscape
Version 2
Land Cover Change
Urban Growth
Forest Fragmentation
Impervious Surface
About the Project
Statewide Information
Your Town
Your Watershed
Interactive Map
Download Data
What We're Measuring
Related Projects & Commentary
Welcome to CCL's Land Cover Change Website
The land cover change portion of Connecticut's Changing Landscape provides basic information about changes to developed, forest and agricultural lands during the period 1985 to 2006. Five directly comparable land cover datasets, from 1985, 1990, 1995, 2002 and 2006, allow us to look at, and quantify, landscape change in our state.
Version 2 is here and includes:
a new date: 2006
a new class in all dates: Agricultural Field
improvements to all classes in all dates! This means that previously released land cover (we call it version 1) cannot be compared to this land cover (version 2)
For further explanation, visit the FAQ "How is Version 2 land cover different from Version 1?"
How much have we developed, and at what rate? Browse this website to find out...
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College of Agriculture and Natural Resources
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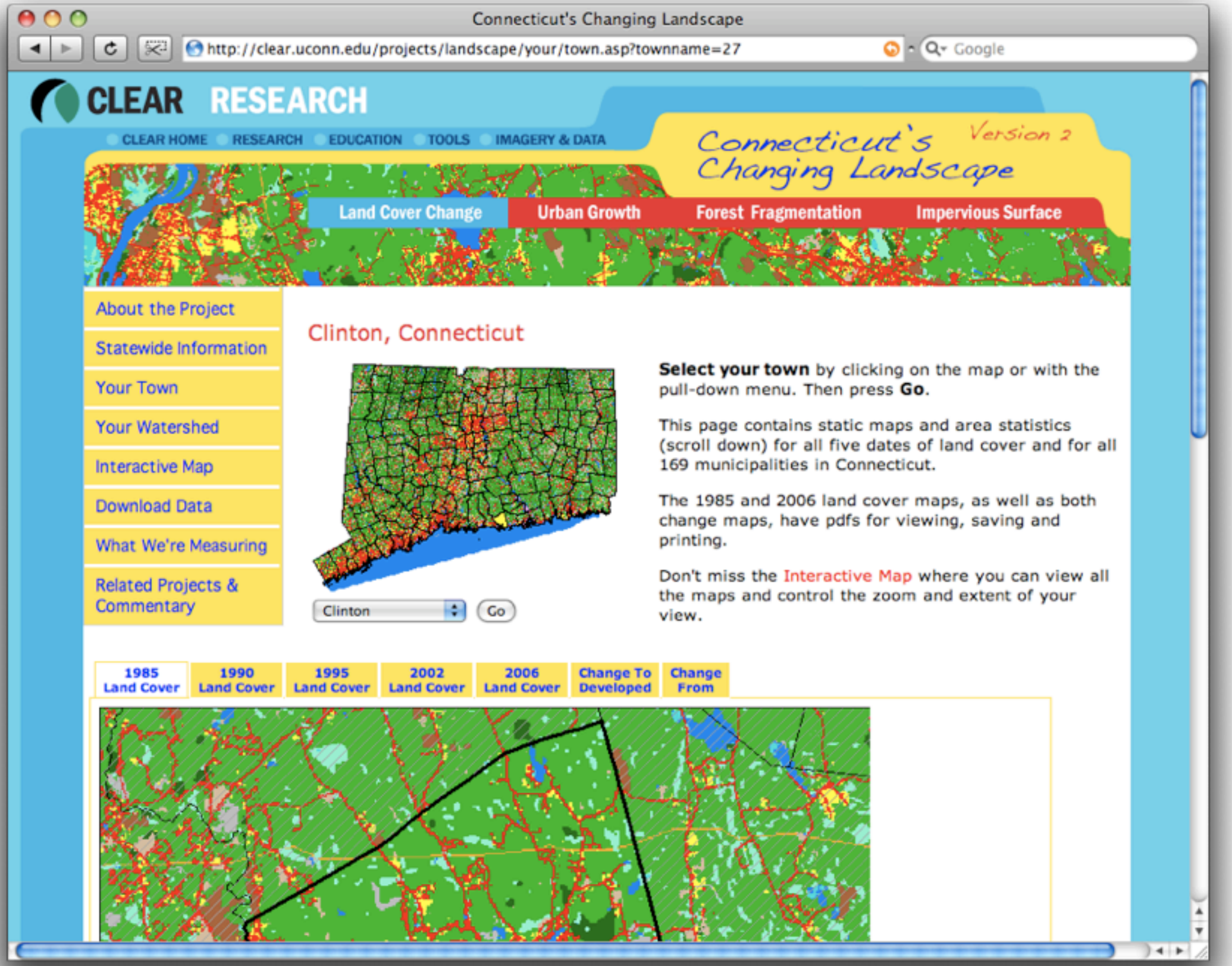
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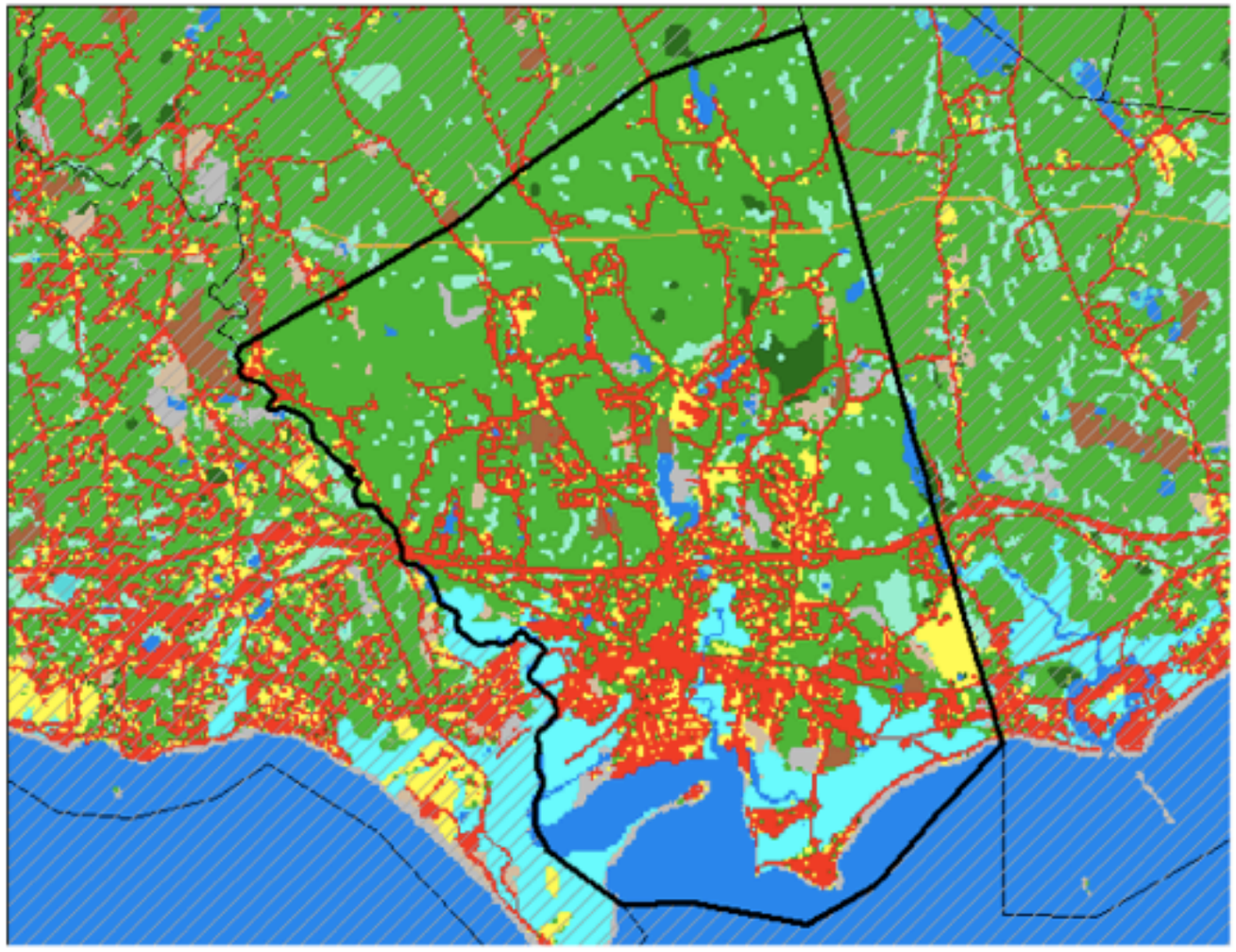
What We're Measuring
Related Projects & Commentary
Clinton, Connecticut
Clinton
Go
Select your town by clicking on the map or with the pull-down menu. Then press Go.
This page contains static maps and area statistics (scroll down) for all five dates of land cover and for all 169 municipalities in Connecticut.
The 1985 and 2006 land cover maps, as well as both change maps, have pdfs for viewing, saving and printing.
Don't miss the Interactive Map where you can view all the maps and control the zoom and extent of your view.
1985 Land Cover
1990 Land Cover
1995 Land Cover
2002 Land Cover
2006 Land Cover
Change To Developed
Change From

Connecticut's Changing Landscape

http://clear.uconn.edu/projects/landscape/your/town.asp?townname=27

Google

1985 Land Cover | 1990 Land Cover | 1995 Land Cover | 2002 Land Cover | 2006 Land Cover | Change To Developed | Change From



1985 Land Cover

Printable PDF

LAND COVER
- Developed
- Turf & Grass
- Other Grass
- Agricultural Field
- Deciduous Forest
- Coniferous Forest
- Water
- Non-forested Wetland
- Forested Wetland
- Tidal Wetland
- Barren
- Utility (Forest)

Clinton Land Cover and Land Cover Change

1985		1990		1995		2002		2006		Change	
acres	% of town	acres	% of town	acres	% of town	acres	% of town	acres	% of town	acres	% change

Connecticut's Changing Landscape

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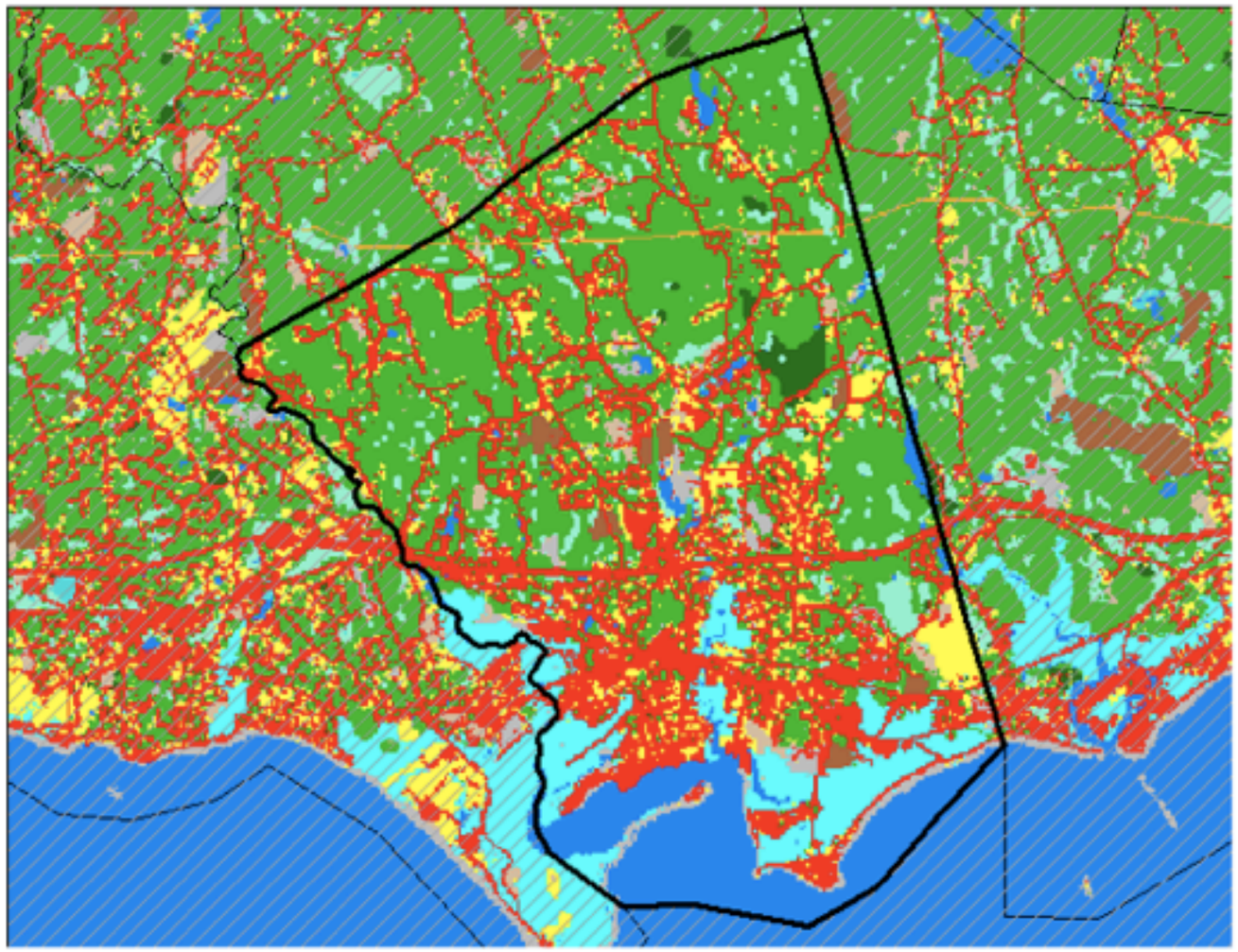

2006 Land Cover

Printable PDF

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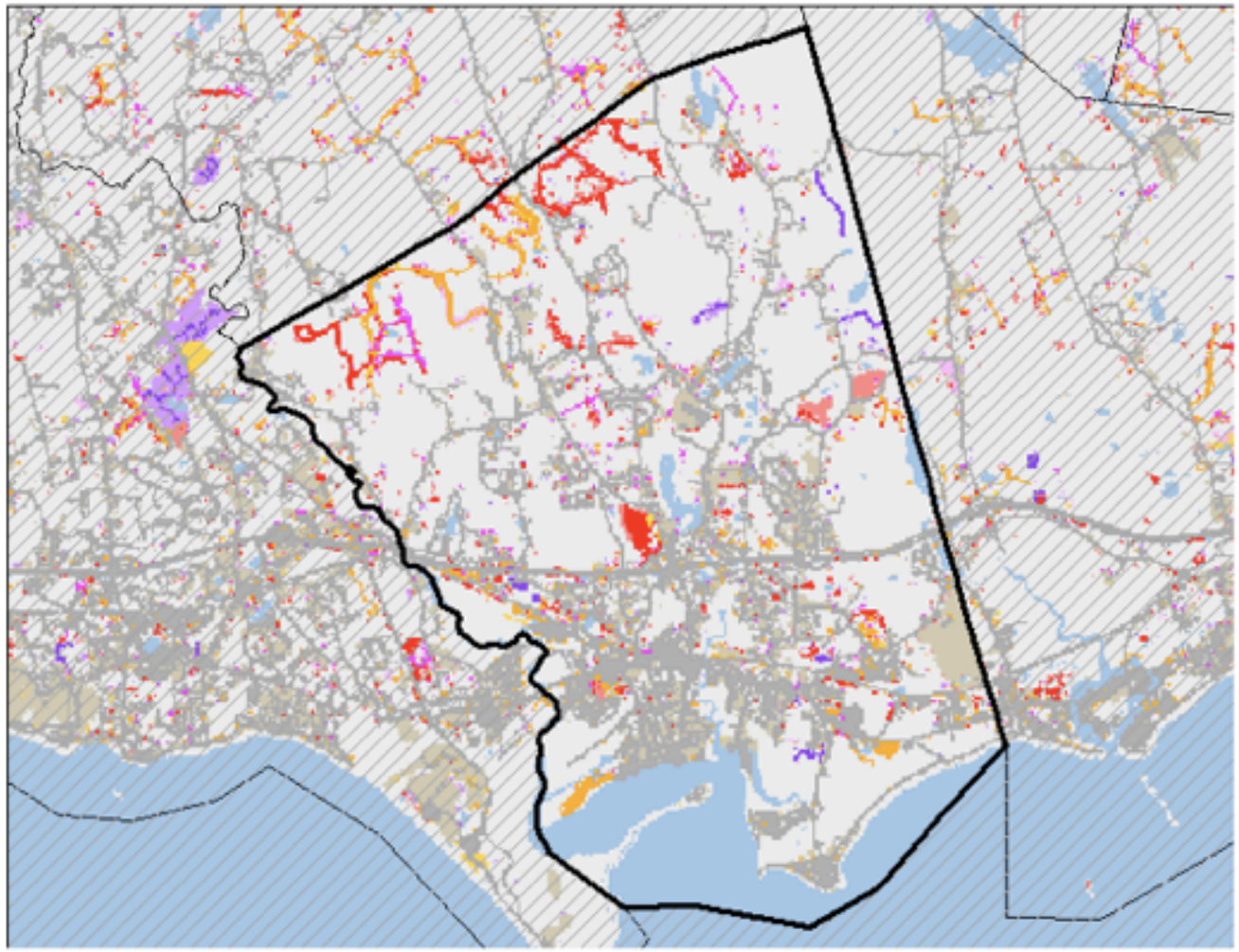

Change To

Printable PDF

No Change Classes
- Developed
- Turf & Grass
- Water
- Undeveloped

From Undeveloped to:
- Developed 1985-1990
- Turf & Grass 1985-1990
- Developed 1990-1995
- Turf & Grass 1990-1995
- Developed 1995-2002
- Turf & Grass 1995-2002
- Developed 2002-2006
- Turf & Grass 2002-2006

More about change maps | Category Descriptions

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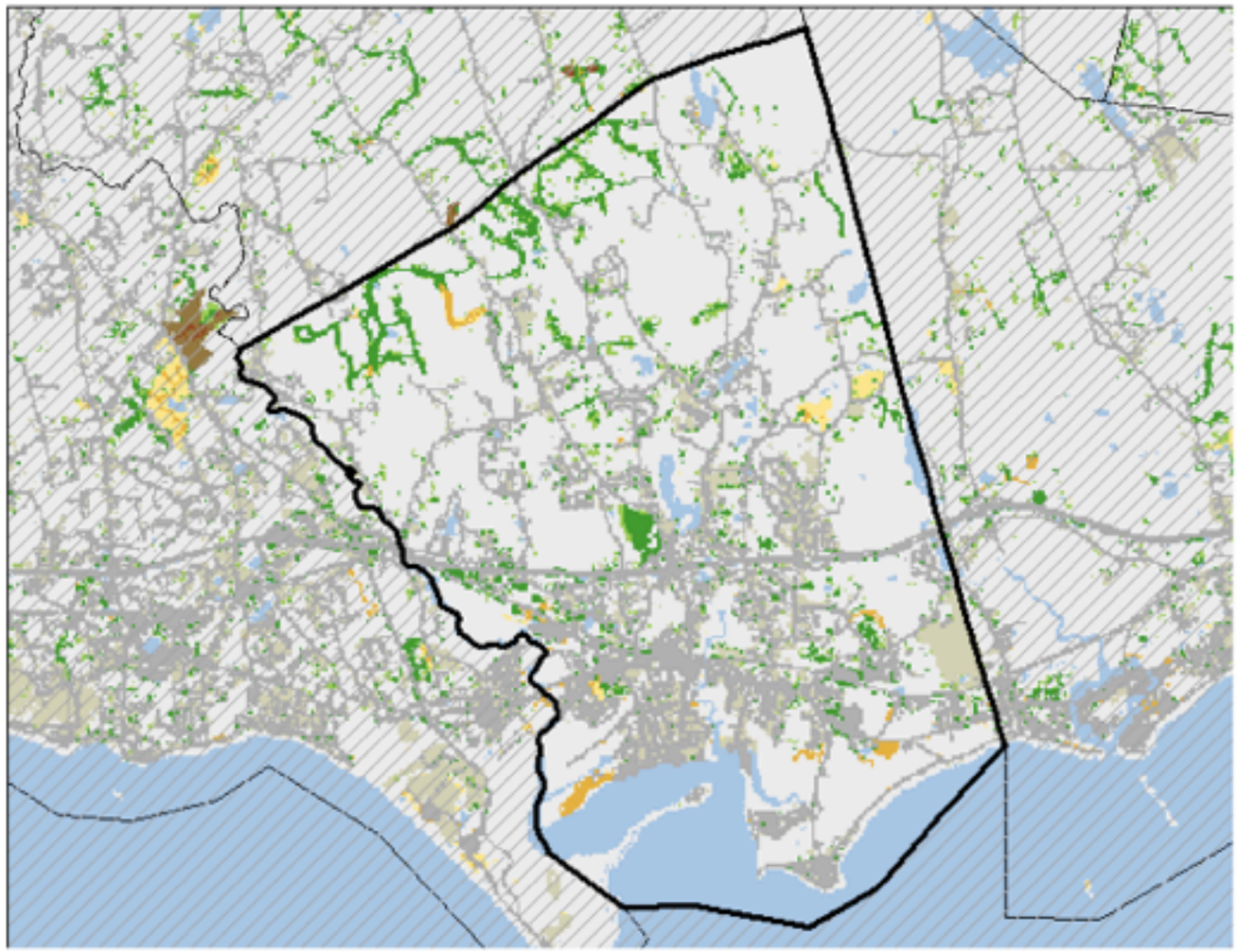

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Printable PDF

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- Ag. Field to Turf & Grass
- Forest to Developed
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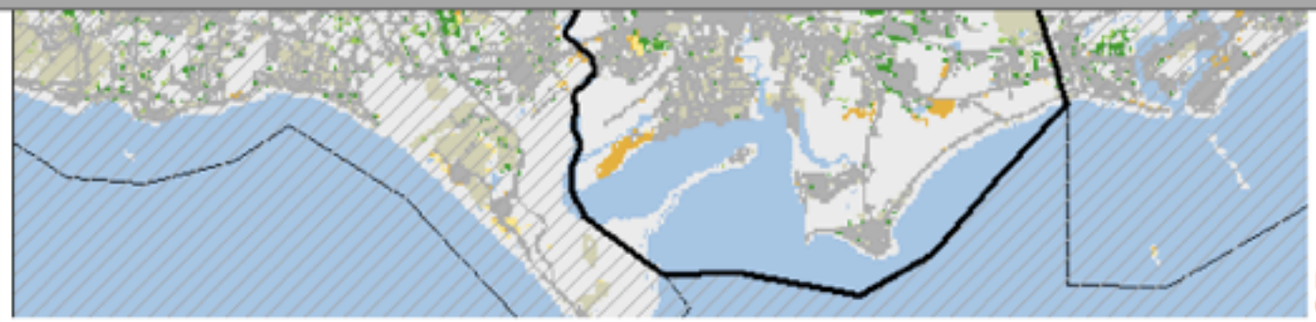

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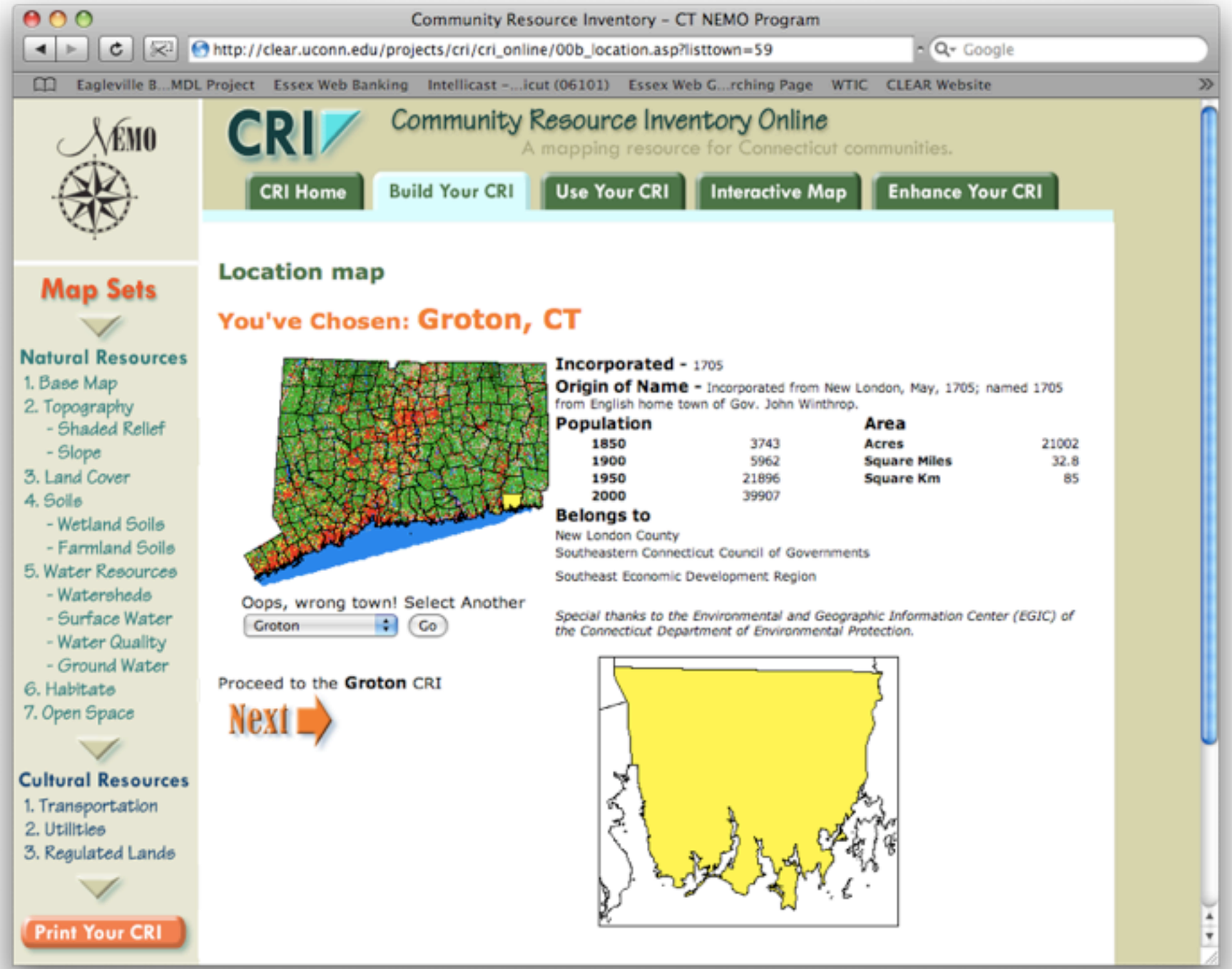
	acres	% of town	acres	% of town	acres	% of town	acres	% of town	acres	% of town	acres	% change
Developed	2377	22.8%	2631	25.2%	2717	26.1%	2997	28.8%	3046	29.2%	669	28.1%
Turf & Grass	546	5.2%	565	5.4%	605	5.8%	742	7.1%	783	7.5%	237.4	43.5%
Other Grasses	114	1.1%	115	1.1%	141	1.4%	122	1.2%	140	1.3%	25.8	22.5%
Agricultural Field	100	1%	112	1.1%	109	1%	113	1.1%	115	1.1%	14.7	14.7%
Deciduous Forest	5443	52.2%	5187	49.8%	5004	48%	4633	44.5%	4535	43.5%	-907.8	-16.7%
Coniferous Forest	136	1.3%	134	1.3%	132	1.3%	125	1.2%	125	1.2%	-10.6	-7.8%
Water	230	2.2%	186	1.8%	171	1.6%	174	1.7%	171	1.6%	-58.4	-25.4%
Non-forested Wetland	13	0.1%	18	0.2%	13	0.1%	13	0.1%	13	0.1%	0.6	4.5%
Forested Wetland	480	4.6%	476	4.6%	474	4.5%	449	4.3%	446	4.3%	-34.2	-7.1%
Tidal Wetland	731	7%	734	7%	741	7.1%	742	7.1%	737	7.1%	6	0.8%
Barren	219	2.1%	232	2.2%	282	2.7%	279	2.7%	279	2.7%	60.5	27.7%
Utility (Forest)	34	0.3%	32	0.3%	32	0.3%	32	0.3%	31	0.3%	-3	-8.7%

University of Connecticut

Tools for "citizen planners" showing current status can also help chart the future

The Online Community Resource Inventory

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PUBLICATIONS
NEWS
CONTACT
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OUTREACH EDUCATION
IMAGERY & DATA
TOOLS
Research
Project Guide
Education
Program Guide
NEMO Program
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Land Use Academy
Forestry
Green Valley Institute
Geospatial Technology Program
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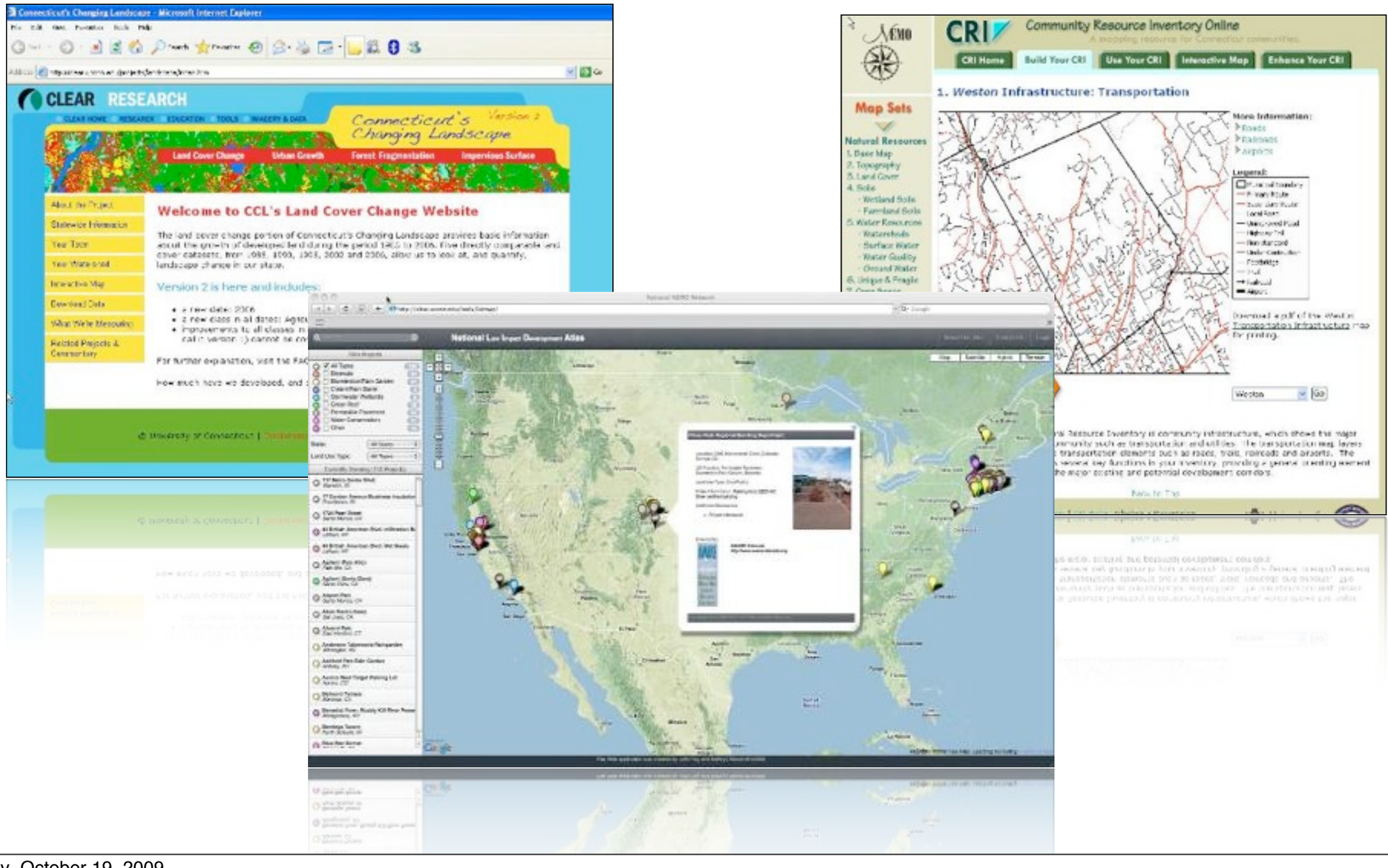
Connecticut's Changing Landscape Project: A User's Guide & Cook's Tour
basics of the project's remote sensing-based methods
a brief description of the differences between Versions 1 and 2
a summary of the statewide results of
Geospatial Training
Intro to GPS 5/13 – 5/14
Making Good Maps 6/12
Intro to GPS 6/25 – 6/26
Click here for more information on the geospatial trainings.

Where we are today:
Interactive geospatial tools on the web



Using Earth Browsers to convey information: the CT LID Inventory

NEMO's CT LID Inventory Website

Submit Company with LID Experience

Similar Web Tools

LID Regulations Inventory

New England LID Inventory

Planning for Stormwater

Local Low Impact Development Atlas

Search the National Atlas | About This Site | Contact Us

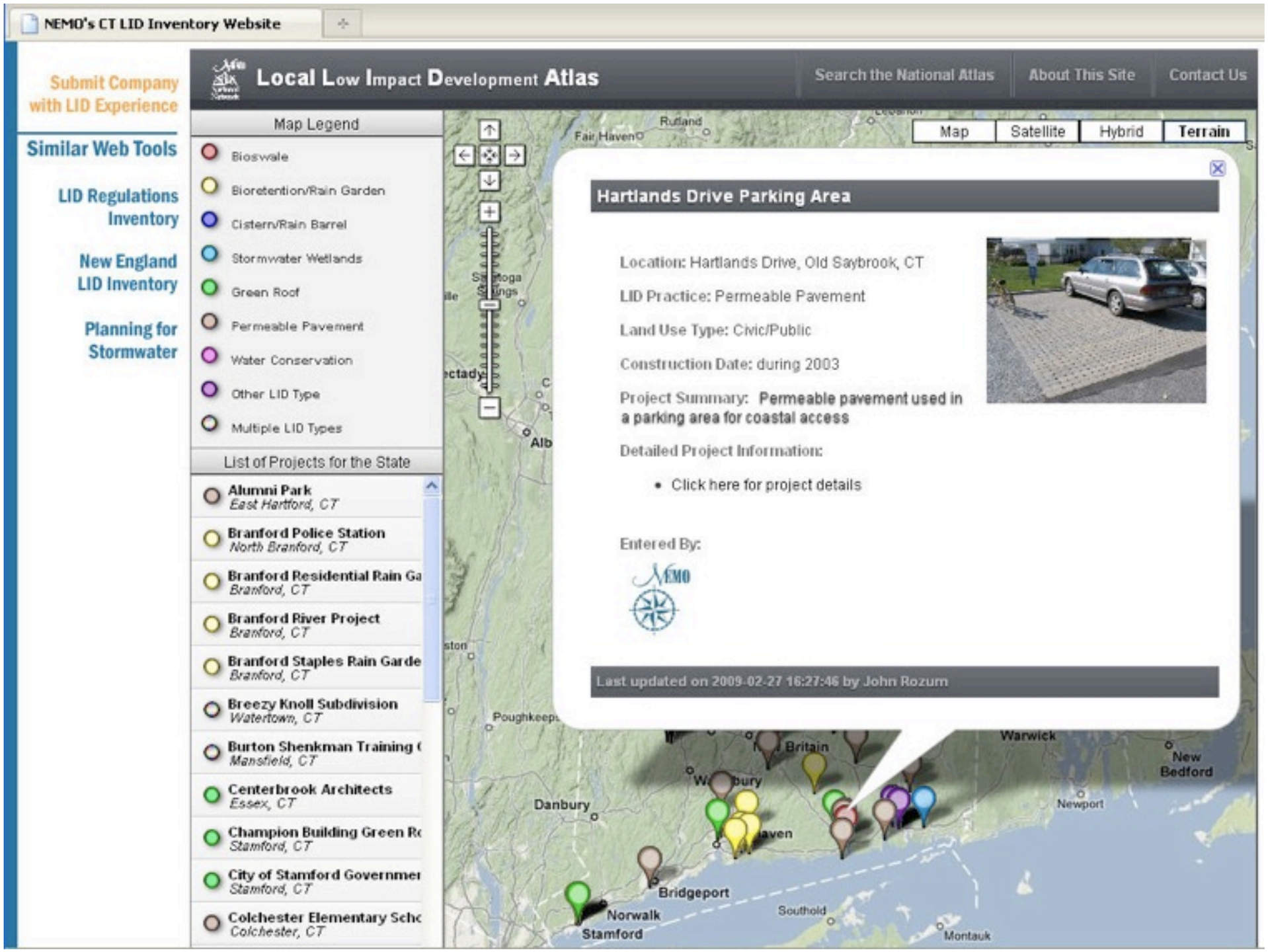
Map Legend

- Bioswale
- Bioretention/Rain Garden
- Cistern/Rain Barrel
- Stormwater Wetlands
- Green Roof
- Permeable Pavement
- Water Conservation
- Other LID Type
- Multiple LID Types

List of Projects for the State

- Alumni Park, *East Hartford, CT*
- Branford Police Station, *North Branford, CT*
- Branford Residential Rain Ga, *Branford, CT*
- Branford River Project, *Branford, CT*
- Branford Staples Rain Garde, *Branford, CT*
- Breezy Knoll Subdivision, *Watertown, CT*
- Burton Shenkman Training (, *Mansfield, CT*
- Centerbrook Architects, *Essex, CT*
- Champion Building Green Re, *Stamford, CT*
- City of Stamford Governmer, *Stamford, CT*
- Colchester Elementary Schc, *Colchester, CT*

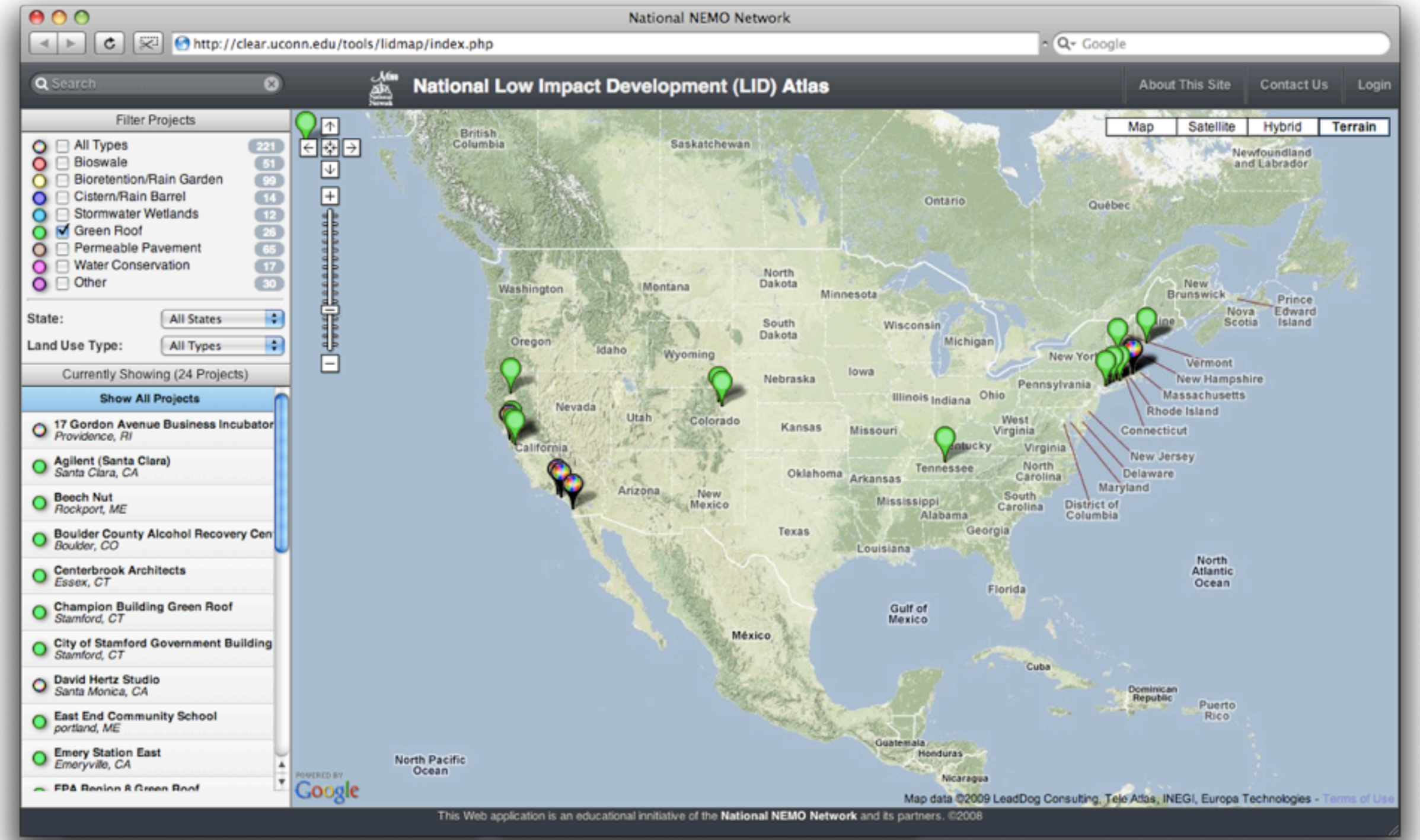
Using Earth Browsers to convey information: the CT LID Inventory



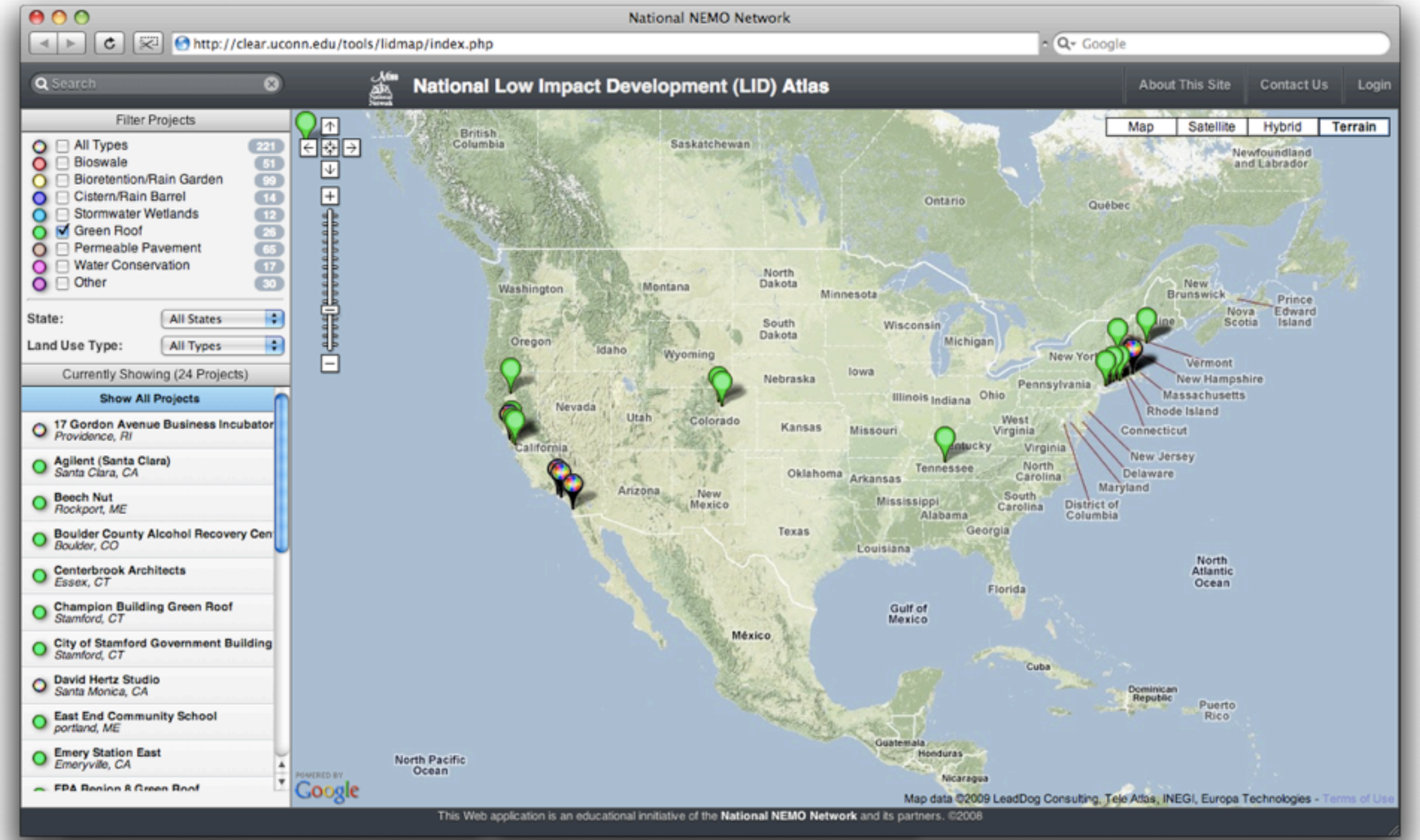
National LID Atlas

National LID Atlas

National LID Atlas



National LID Atlas



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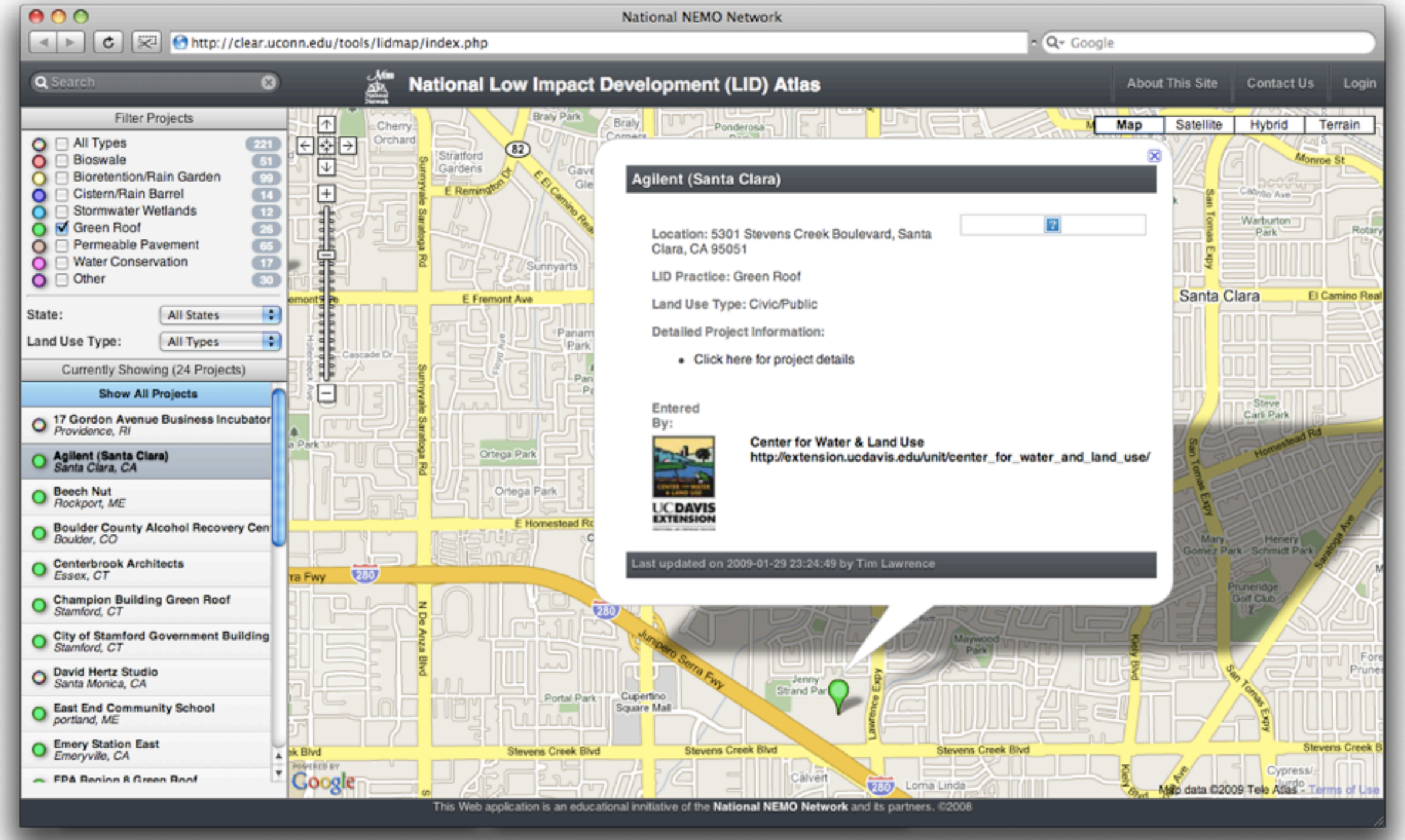

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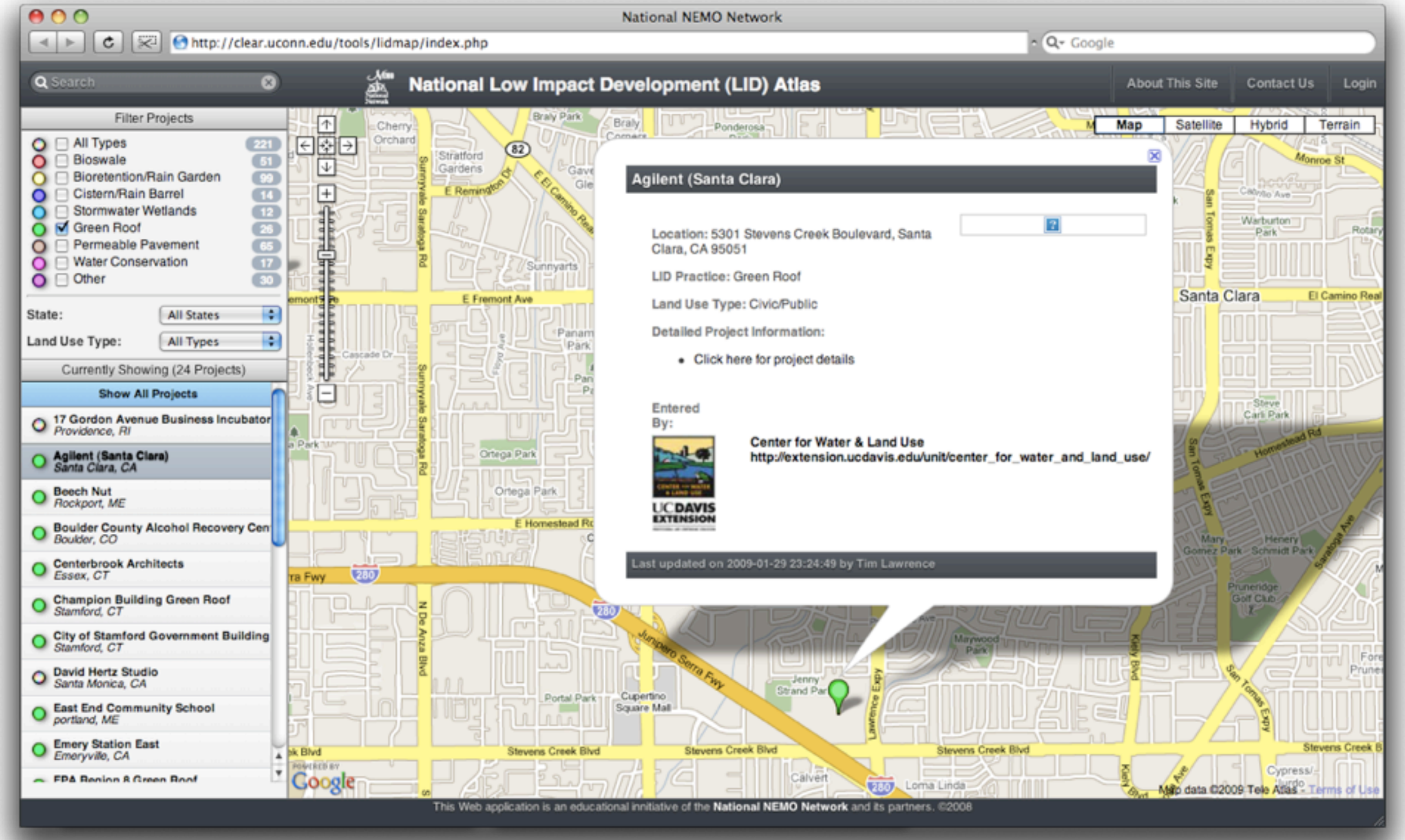

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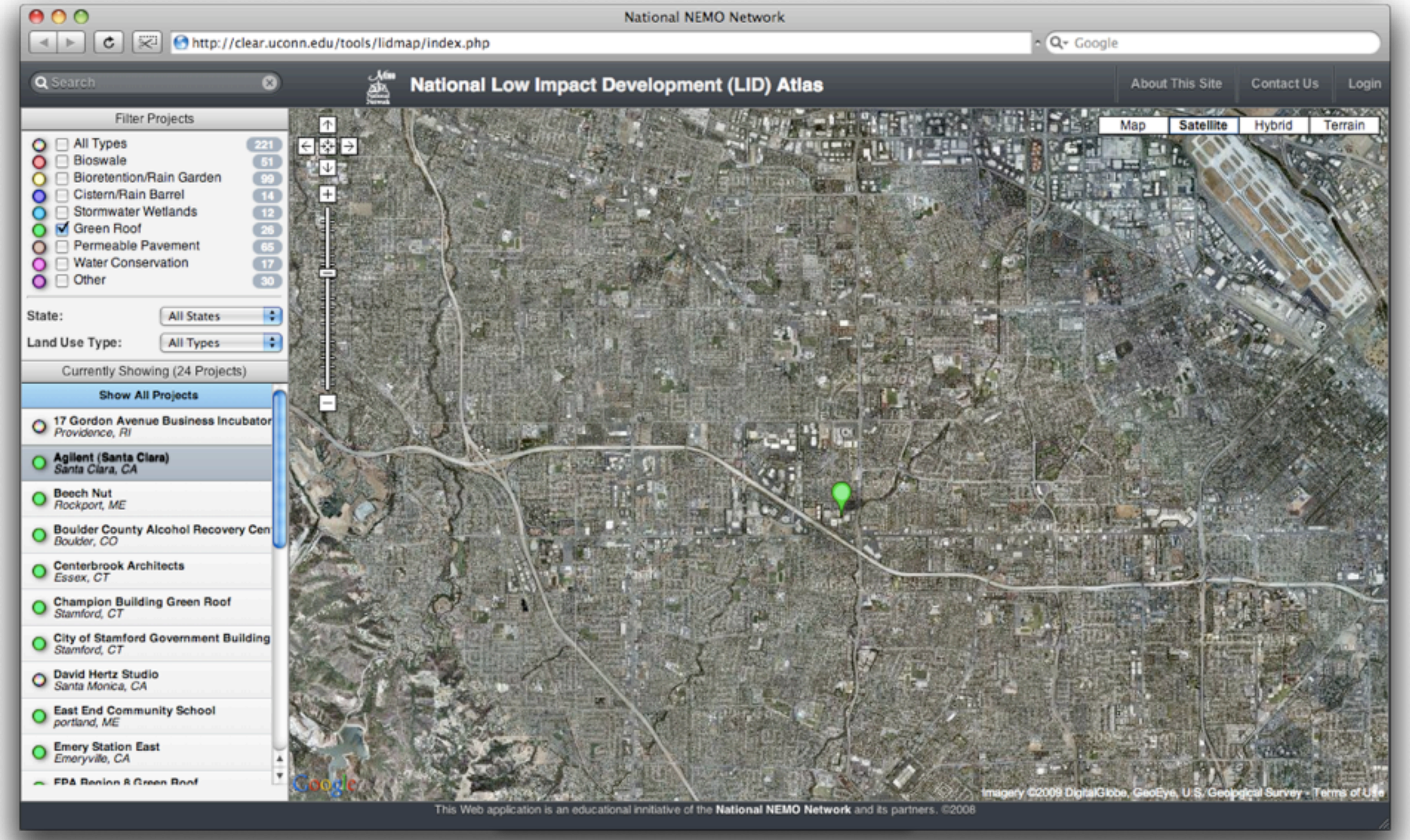

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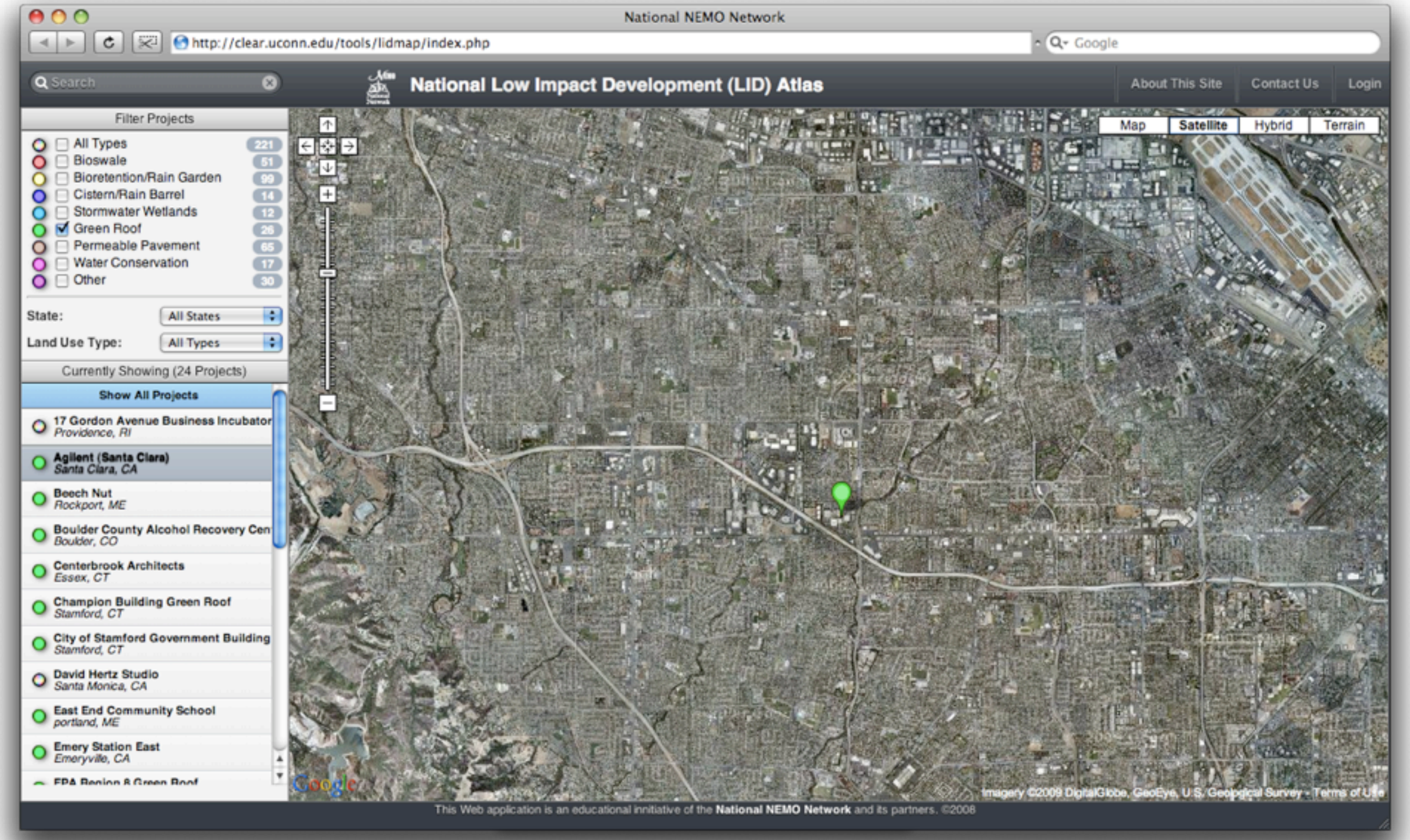
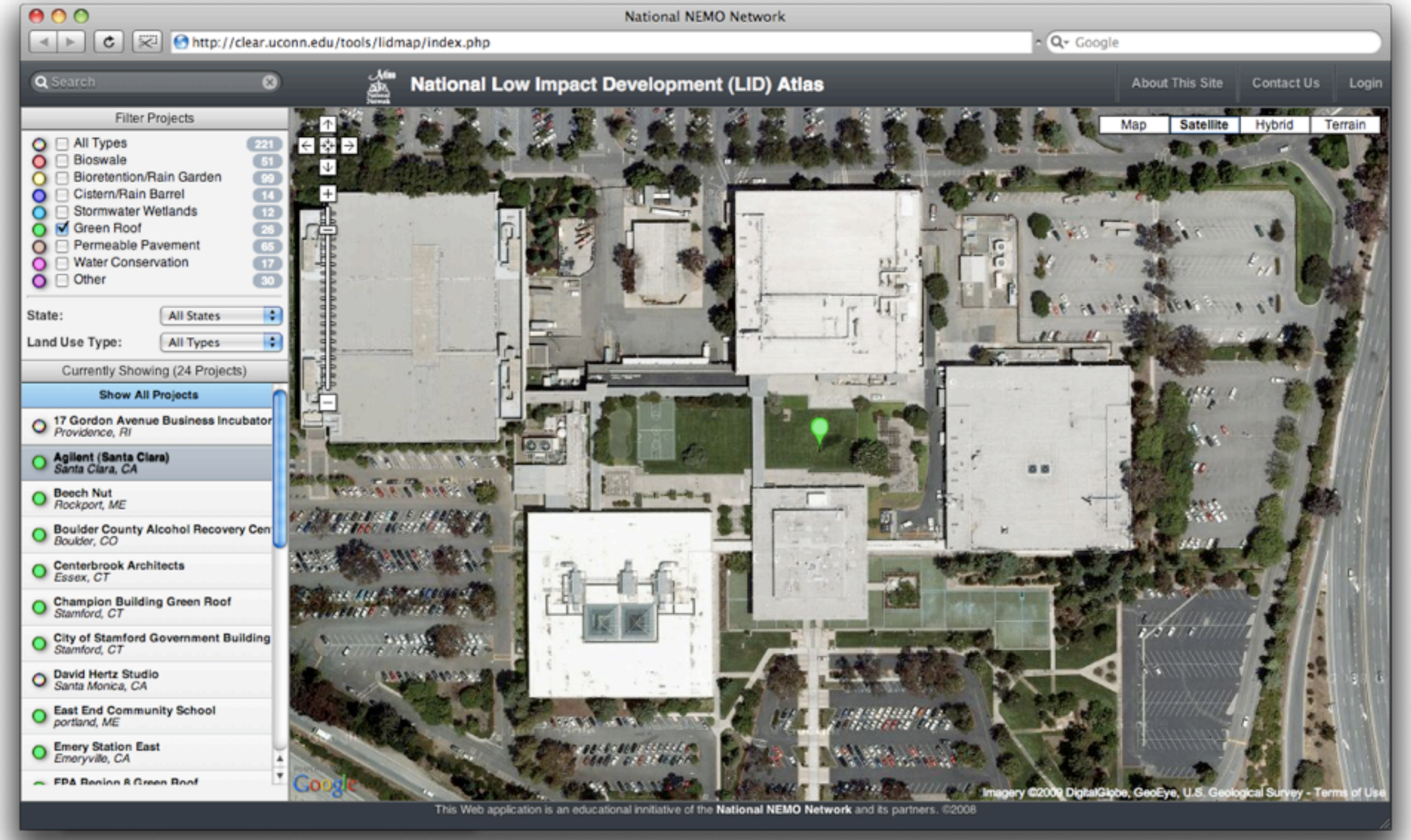


National LID Atlas



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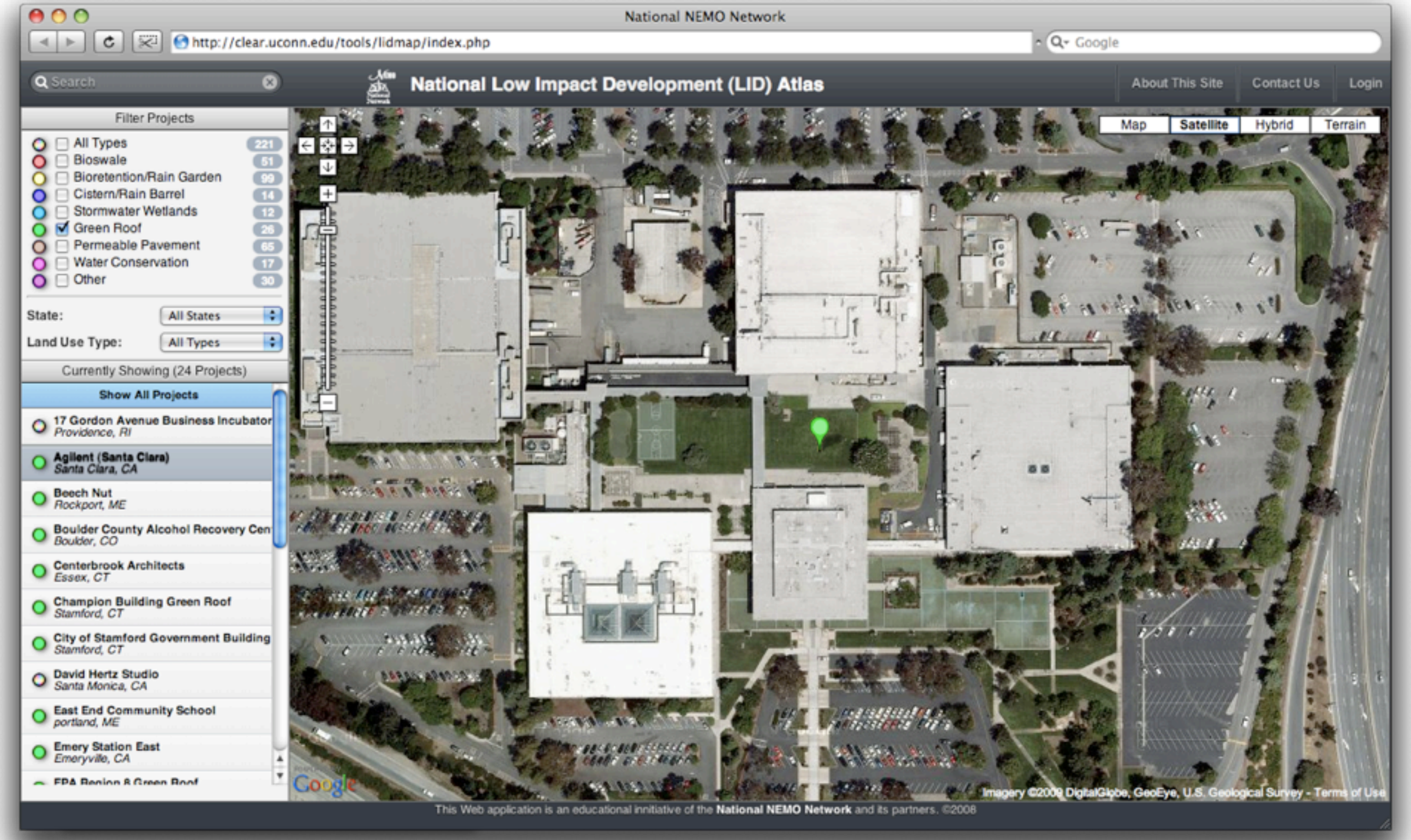

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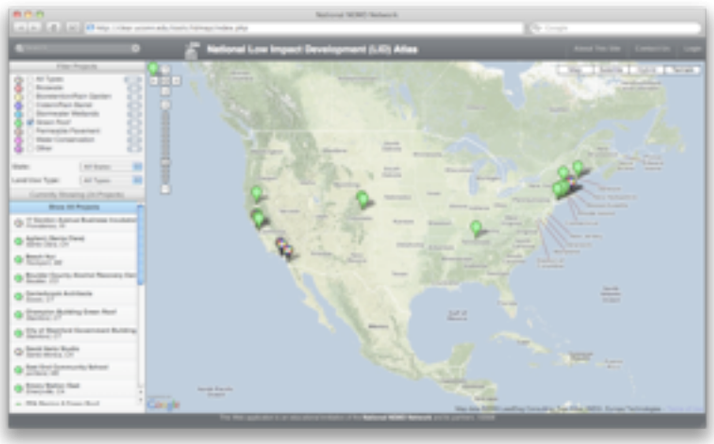

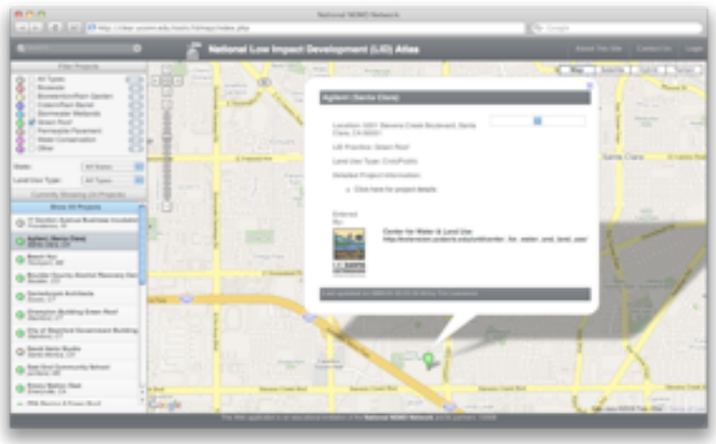

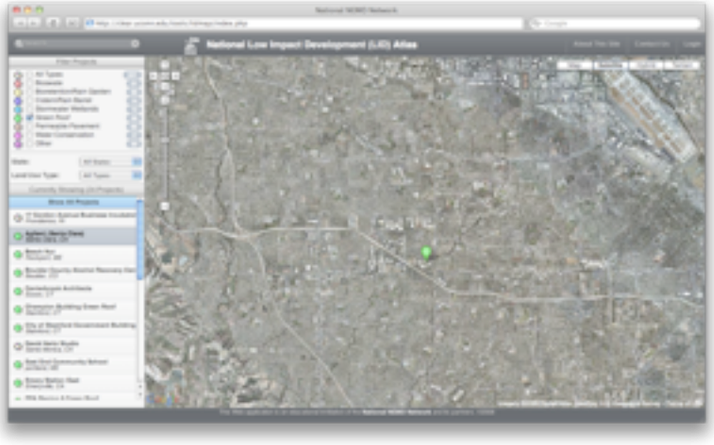

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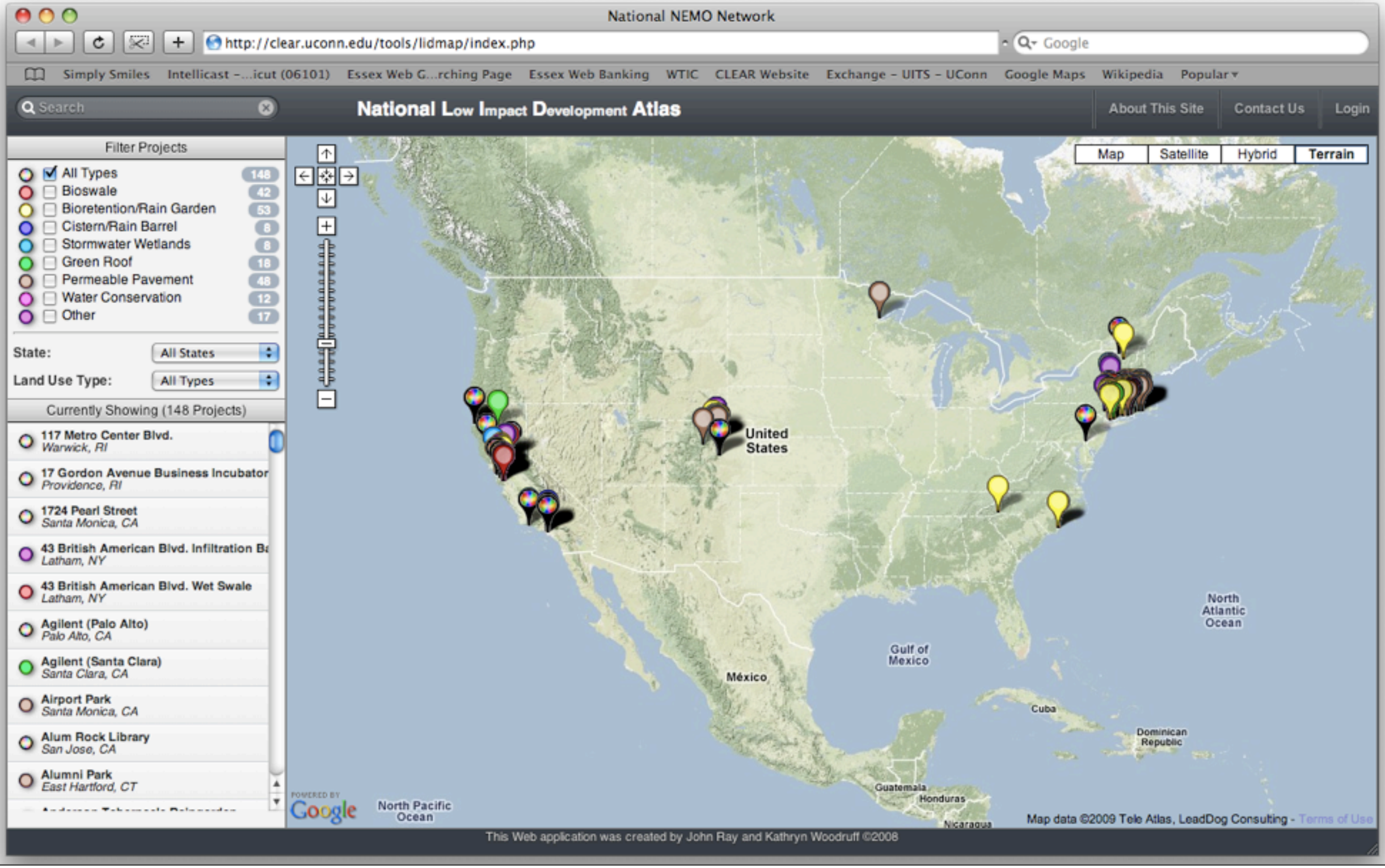

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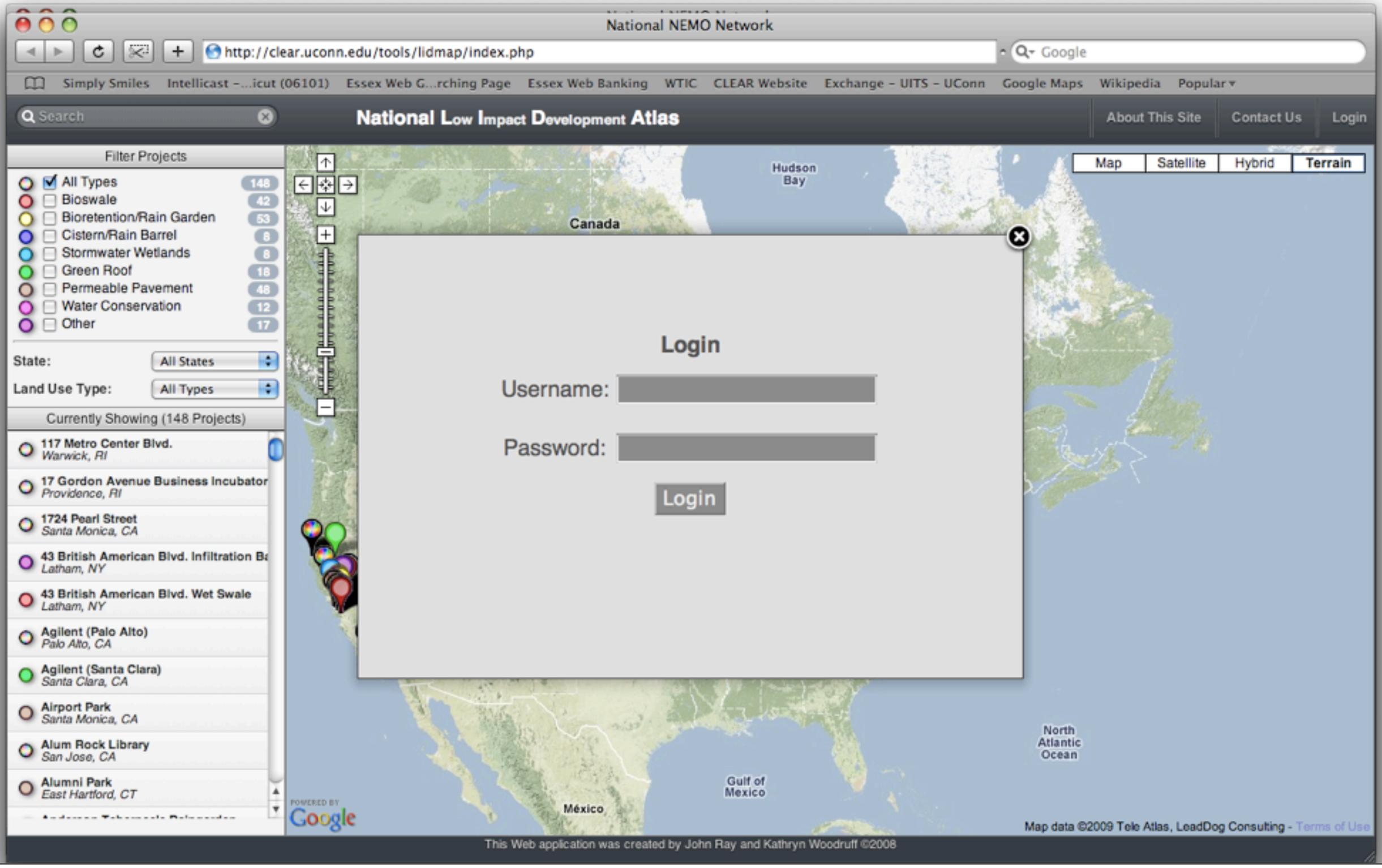


Putting Maps & Data on the Web Using "Mash-up" Tecnology with GoogleMaps and GoogleEarth

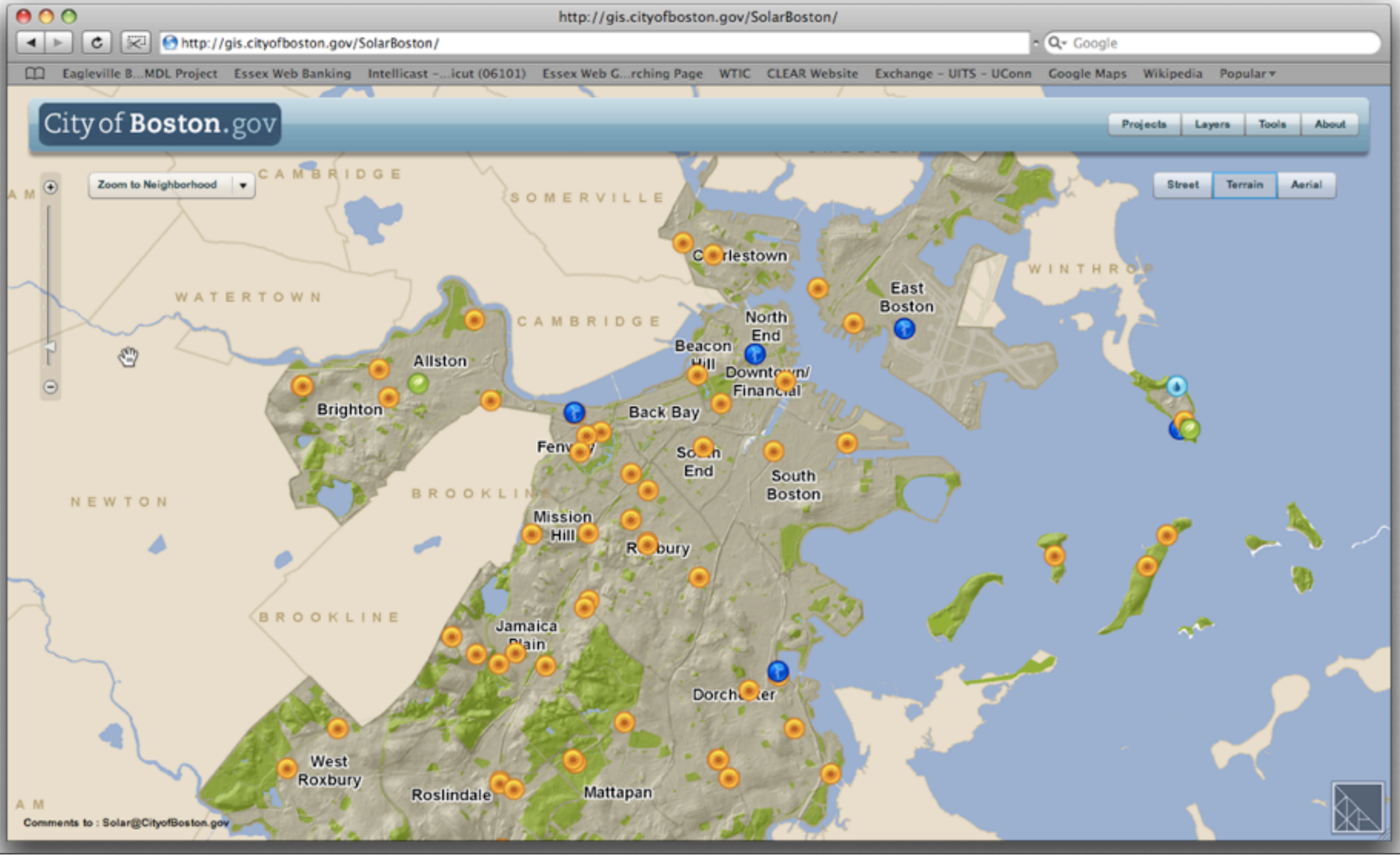
(coming to a national Land/Sea Grant water quality conference near you soon...)

The next level of web tools:

Interactive tools that include "on the fly" analytical capabilities

The next level of web tools:

Interactive tools that include "on the fly" analytical capabilities



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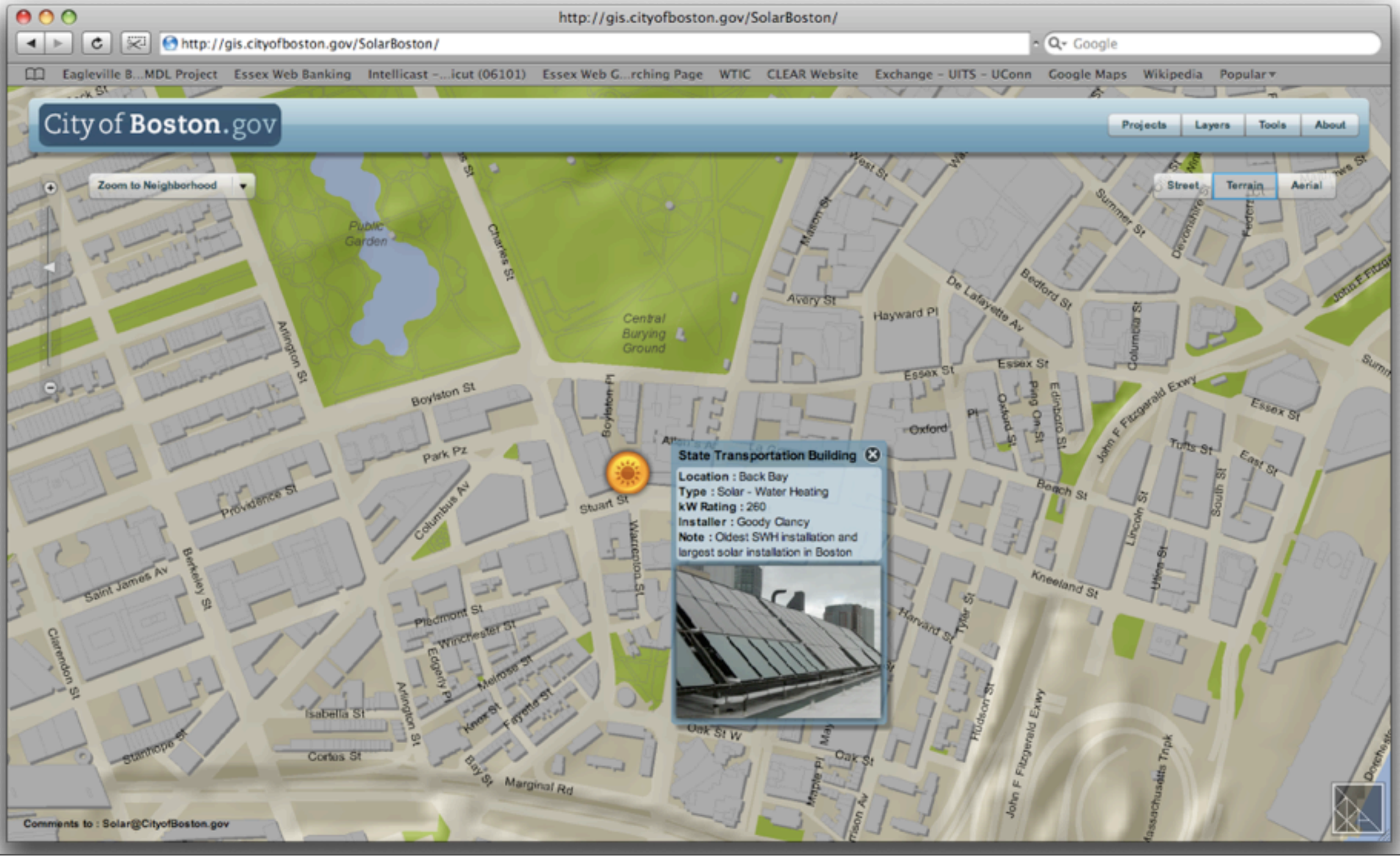

The next level of web tools:

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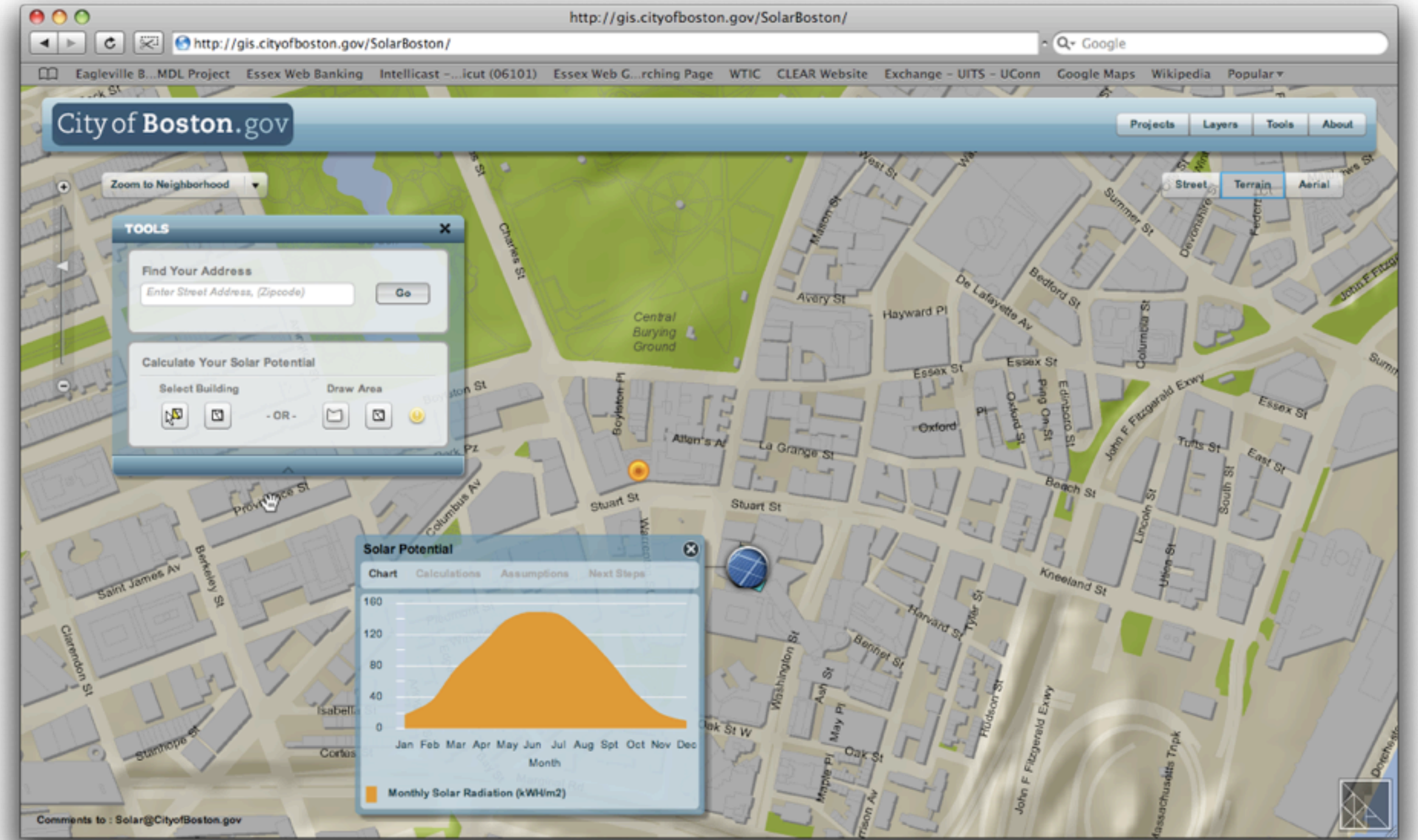
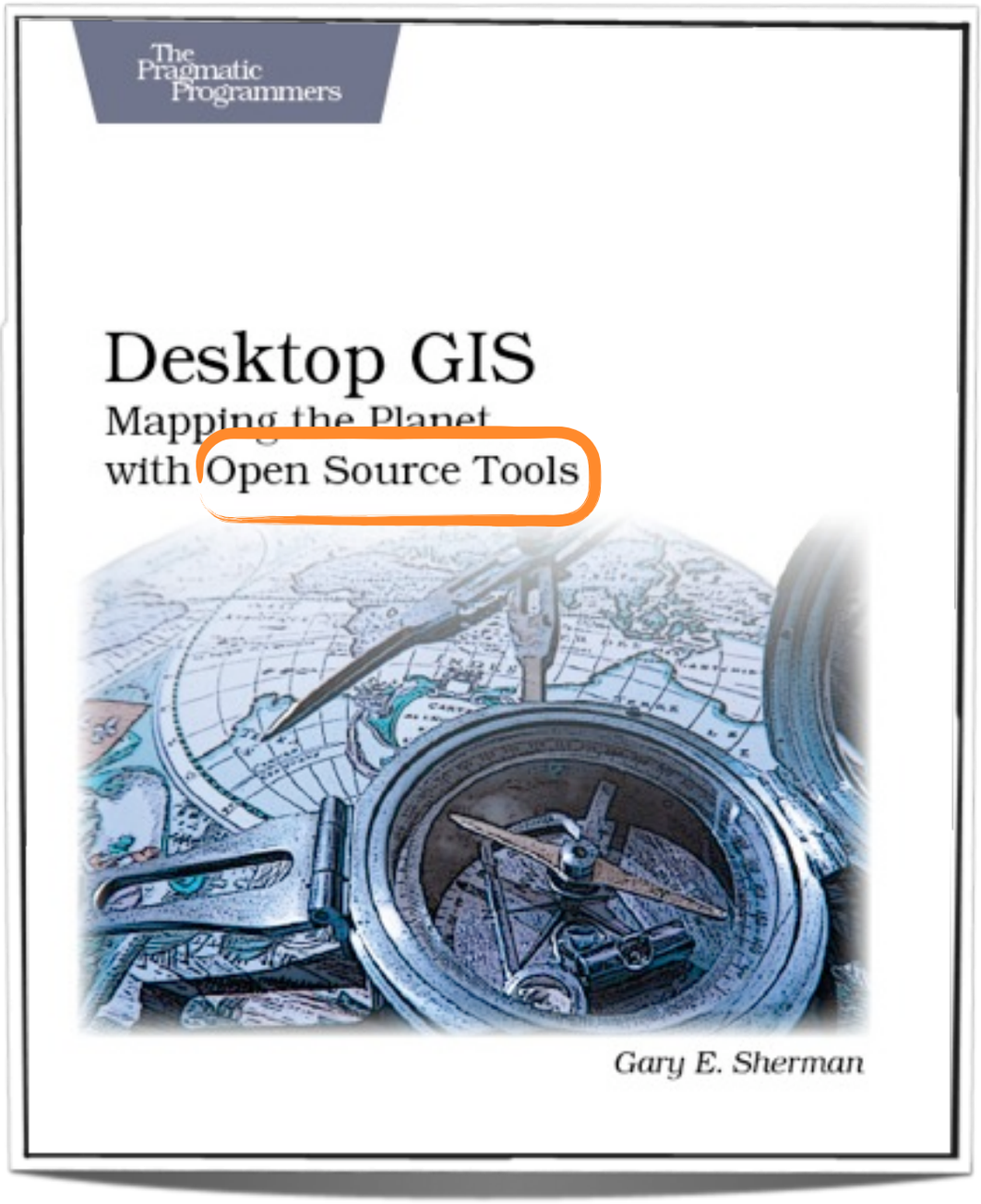


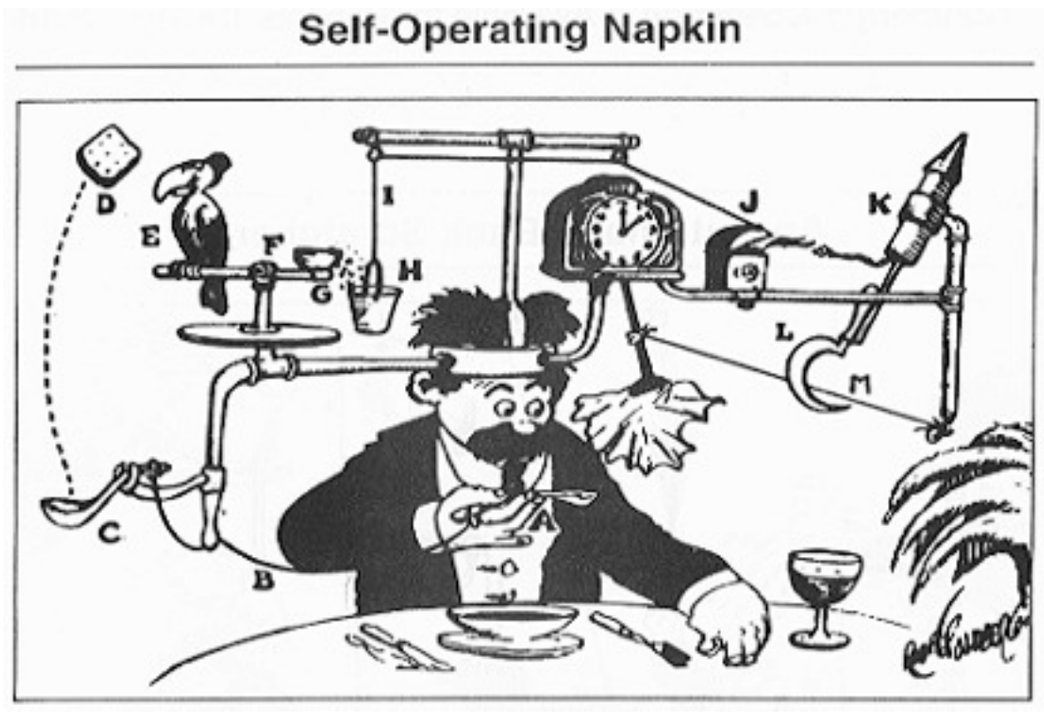
And there's other stuff I'm equally unqualified to talk about...

This is an incredibly rapidly-changing field.



Today's Tour de Force to include....

- Communities as the target audience
- The evolution of geospatial technologies & decision support
- Deep thoughts, with examples



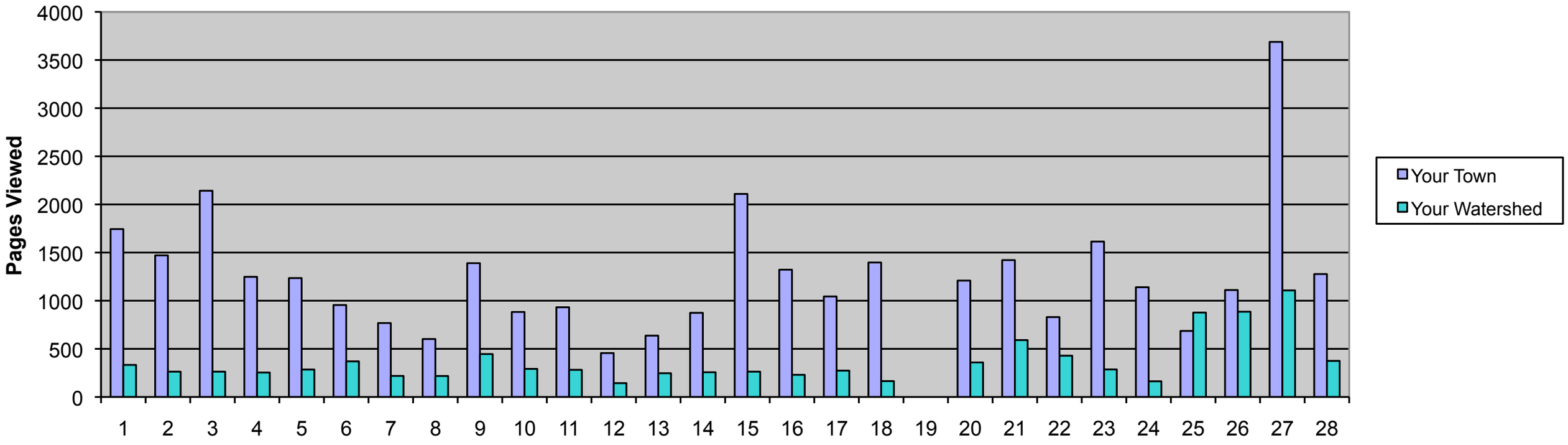
1. If you build it, and it's not relevant, they won't come.

It's Thursday night at 9:45 pm, and it's subdivision approval time...

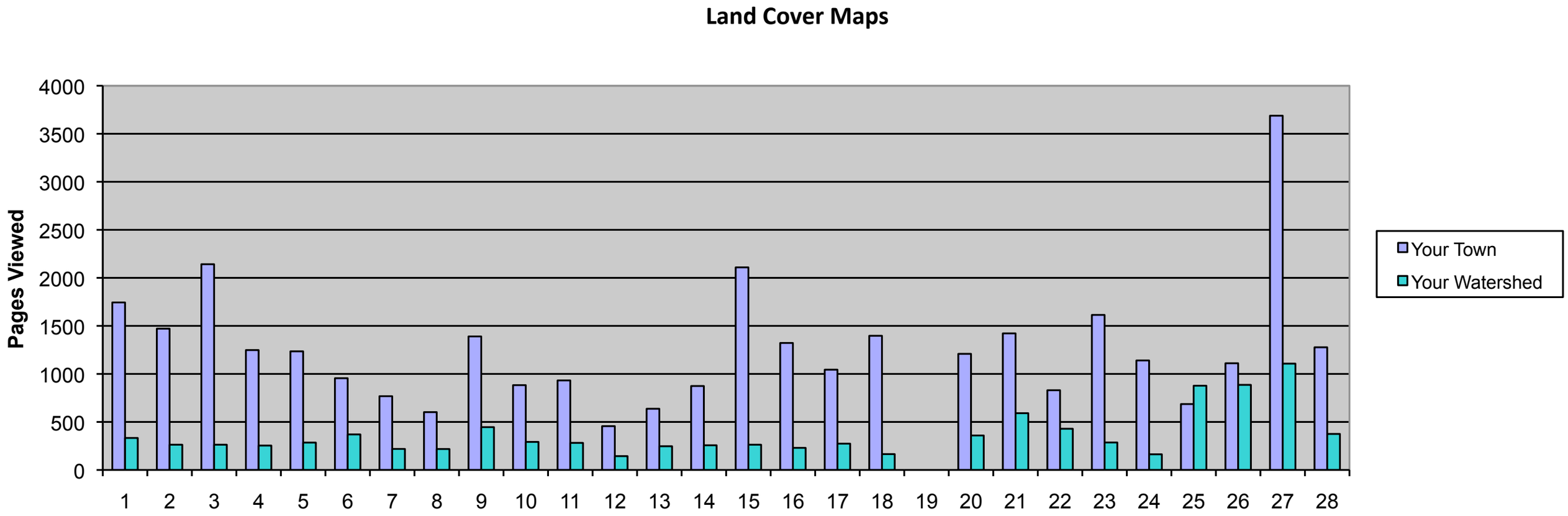
Do you know where your techno tool is?

For instance...

Land Cover Maps

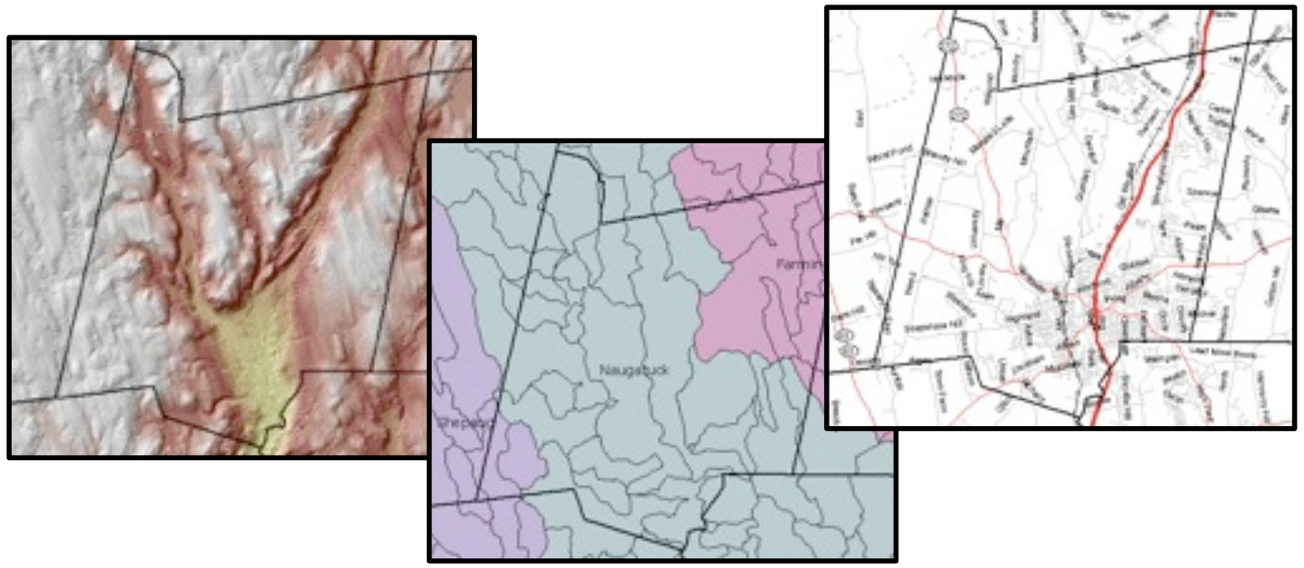


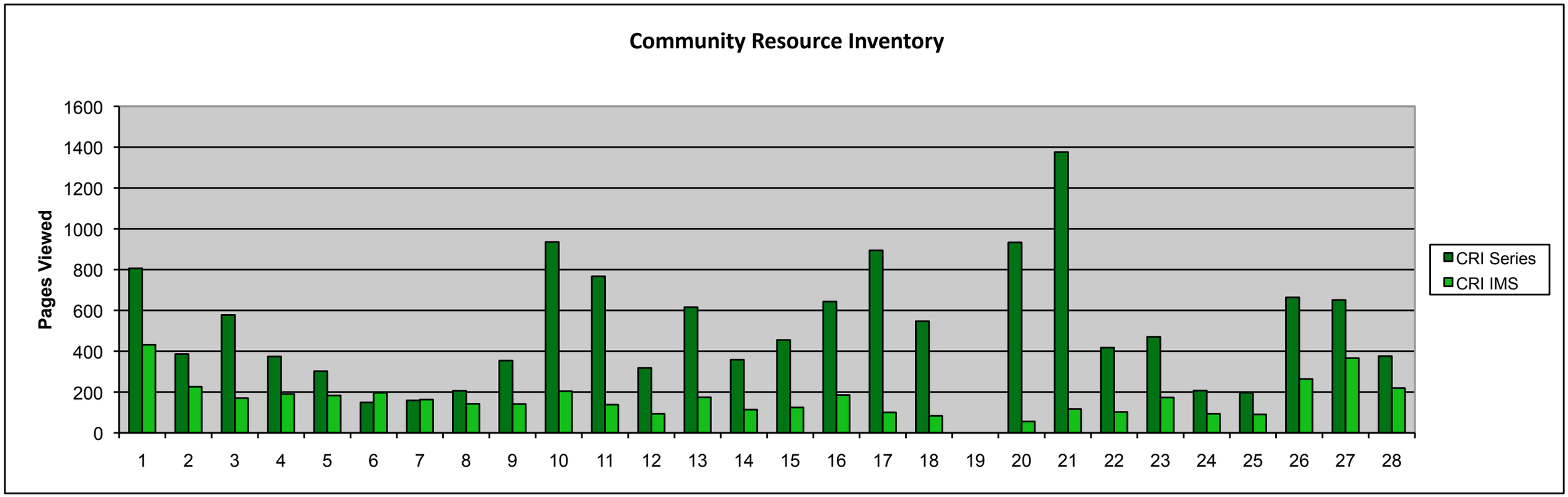
For instance...



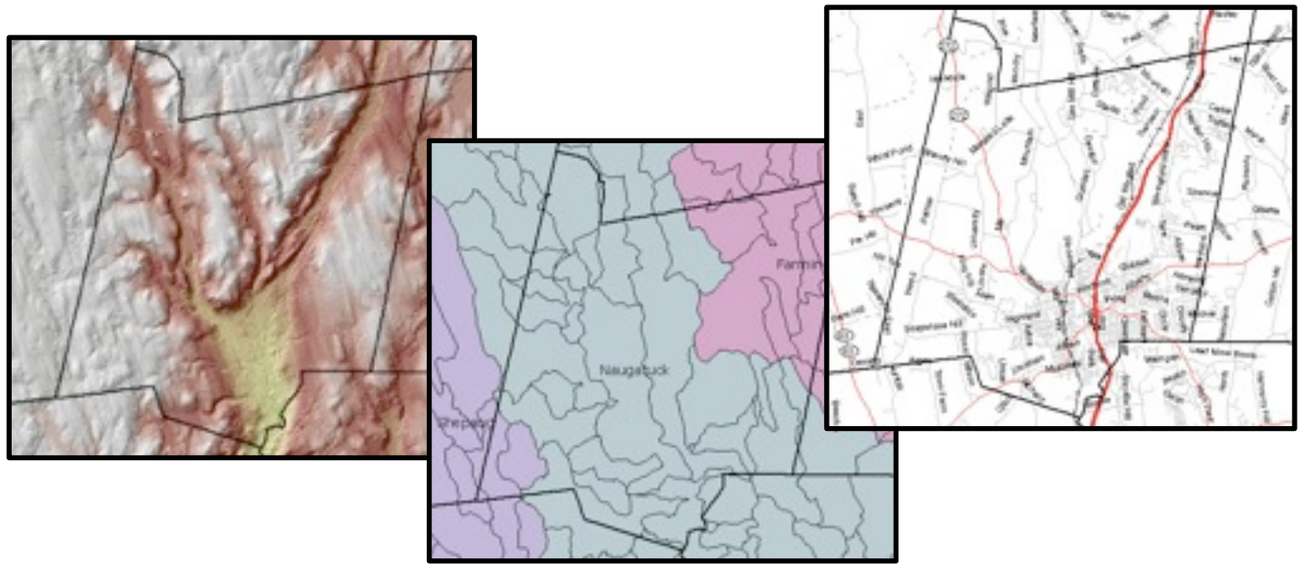
Information packaged by town is still the most popular by far (in CT)

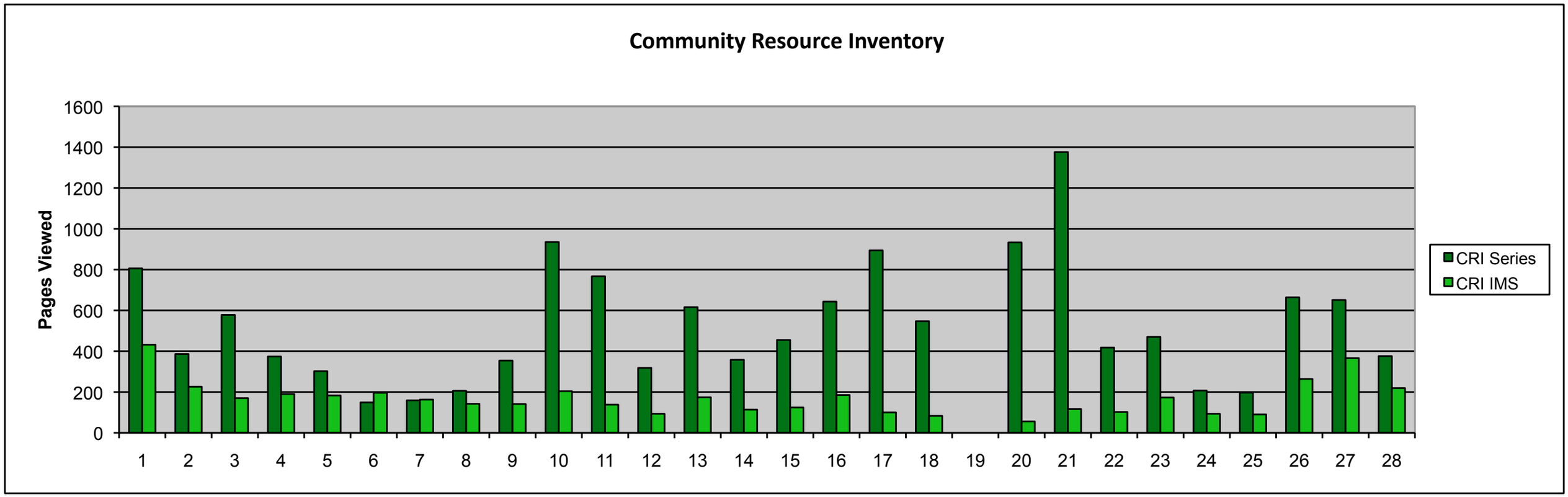
For instance...





For instance...



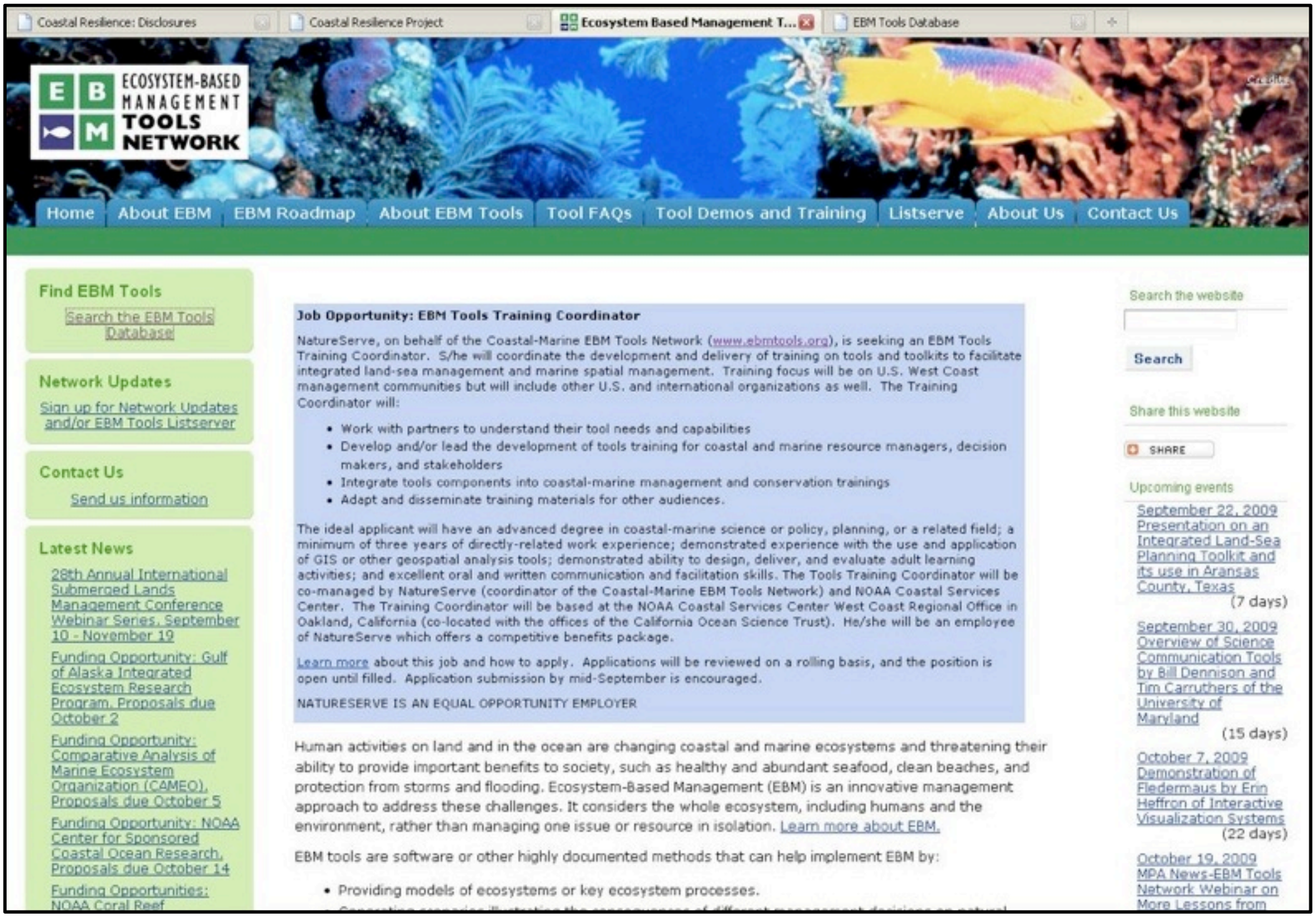


Basic static maps are more popular that interactive mapping by far (in CT)

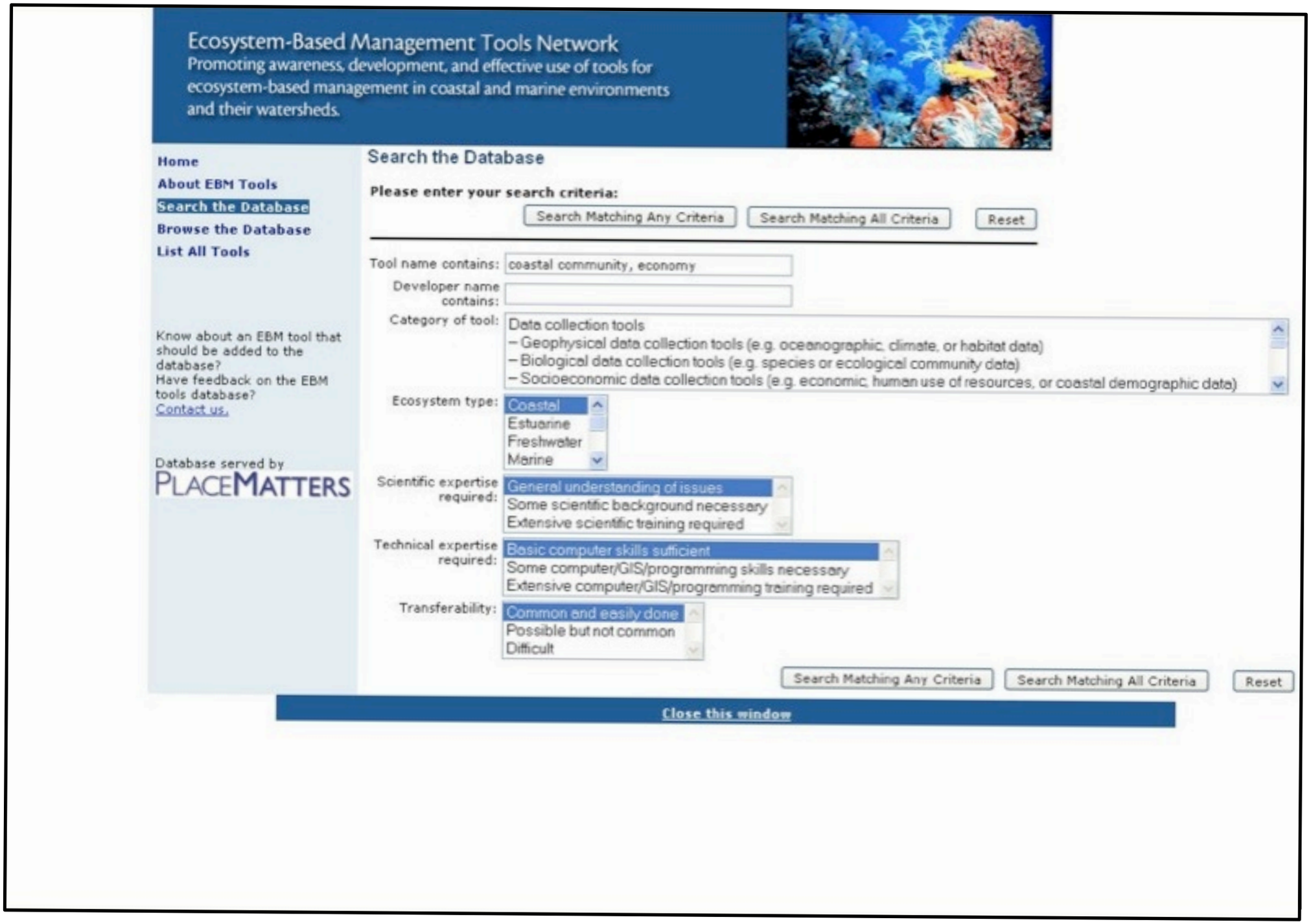
"Franchising" the Online CRI

CT, RI, SC, NY, MN, DE

Ecosystem-Based Management (EBM) Tools



Ecosystem-Based Management (EBM) Tools



Ecosystem-Based Management (EBM) Tools

Search Results

Here are the items we found that matched your criteria:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Click on the name of any tool to see details.

Tool **AGWA - Automated Geospatial Watershed Assessment Tool**

Description: The Automated Geospatial Watershed Assessment (AGWA) Tool is a GIS-based watershed management tool that parameterizes and runs two watershed models, KINEROS2 and SWAT.

Website: www.tucson.ars.ag.gov/agwa

Tool **AmericaSpeaks- 21st Century Town Meeting**

Description: AmericaSpeaks provides citizens with a greater voice in planning and policy-making by integrating keypad polling and groupware computers with authentic public deliberation. AmericaSpeaks has

Website: www.americaspeaks.org

Tool **AQUATOX**

Description: AQUATOX is a mechanistic simulation model for aquatic systems. AQUATOX predicts the fate of various pollutants, such as nutrients and organic chemicals, and their effects on the ecosystem, including fish,

Website: http://www.epa.gov/waterscience/models/aquatox/

Tool **ARIES - ARtificial Intelligence for Ecosystem Services**

Description: ARIES is a web-based technology offered to users worldwide to assist rapid ecosystem service assessment and valuation (ESAV). Its purpose is to make environmental decisions easier and more

Website: http://ecoinformatics.uvm.edu/aries

Tool **ASSETS**

Description: ASSETS is a screening model that can be used as an integrated approach for eutrophication assessment. This model provides an overall classification of the eutrophication status of the system into

Website: www.eutro.org/register

Tool **Atlantis**

Description: Atlantis is an ecosystem box-model intended for use in management strategy evaluation. The overall structure of Atlantis is based around having multiple alternative submodels to represent each step in

Website: www.csiro.au/science/ps3i4.html#1

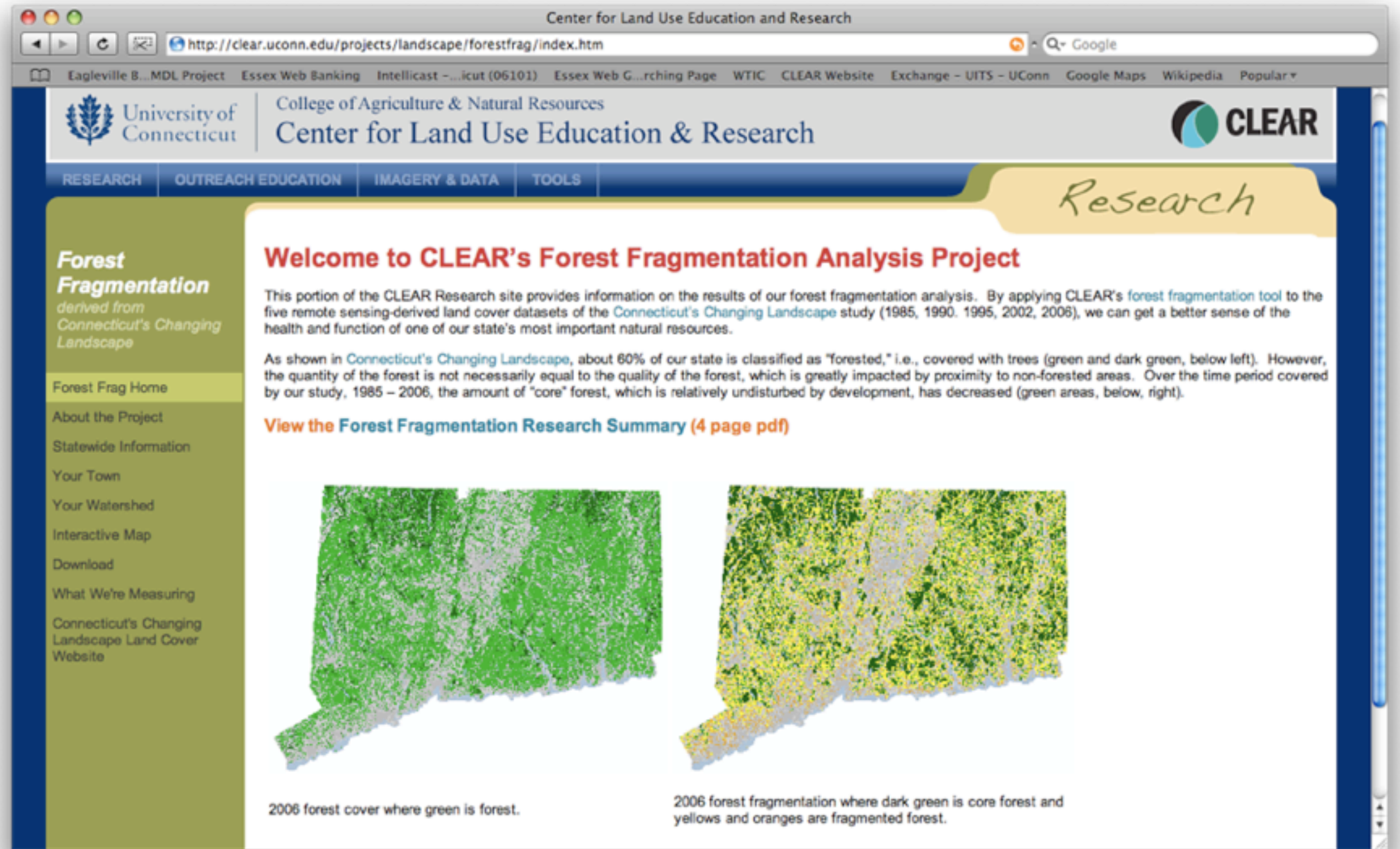
Tool **BathyFusion Toolbox**

Description: BathyFusion Toolbox is an ASA in-house modeling tool as well as a commercially available ArcGIS extension that enables fusion of disparate topographic or bathymetric data sources into a unified high

Website: http://www.asascience.com/software/housetools/bathyfusion.shtml

Tool **Blueline Group (formerly UGrow)**

1b. If you build it and it's relevant but not accessible, they won't come.



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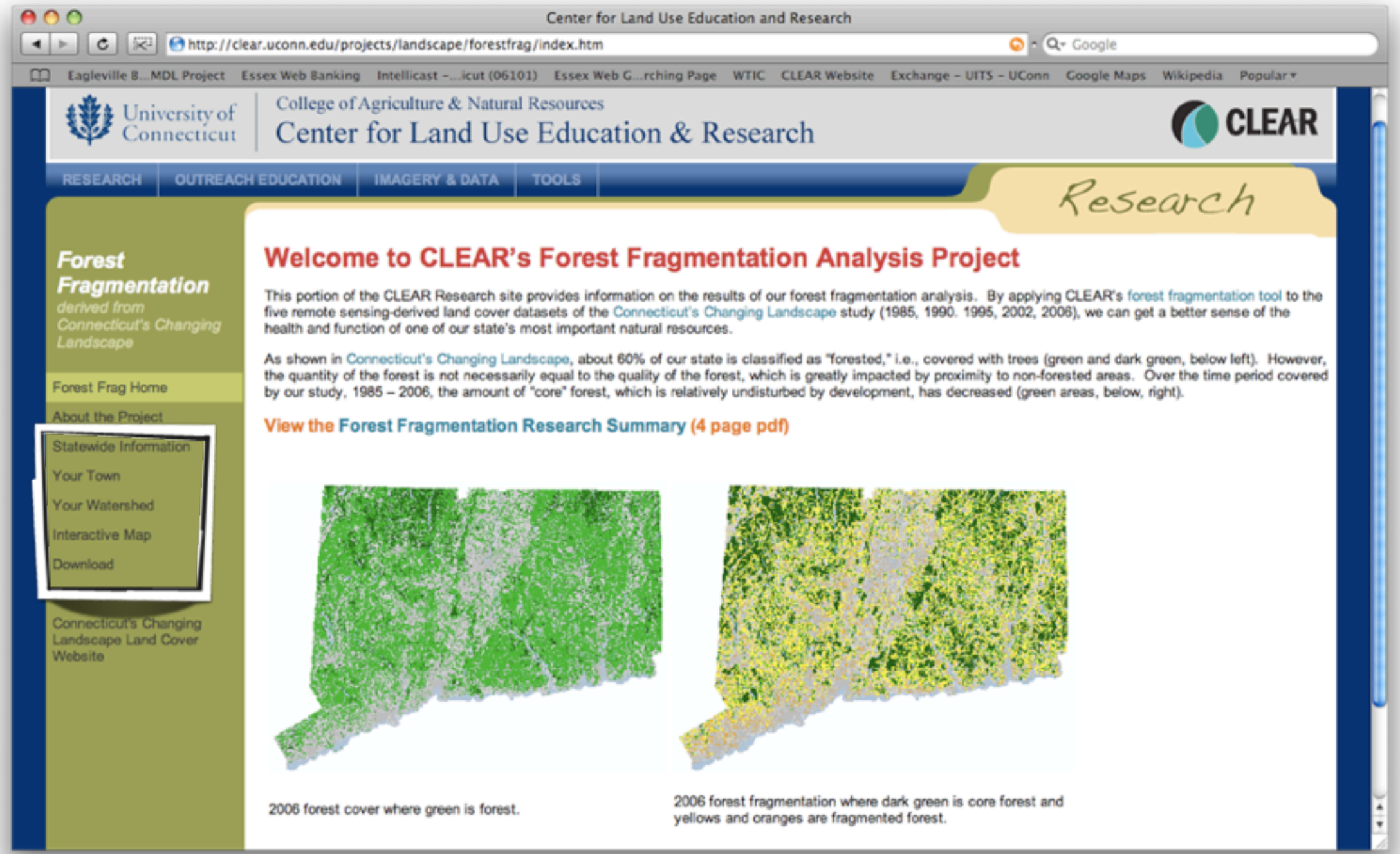
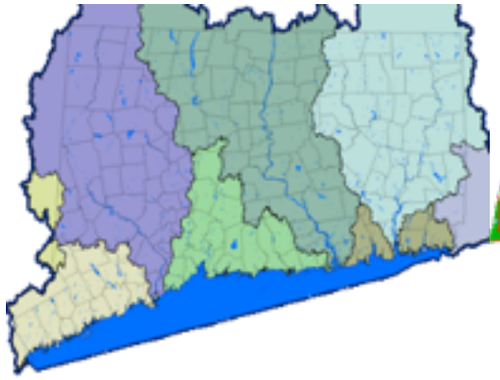
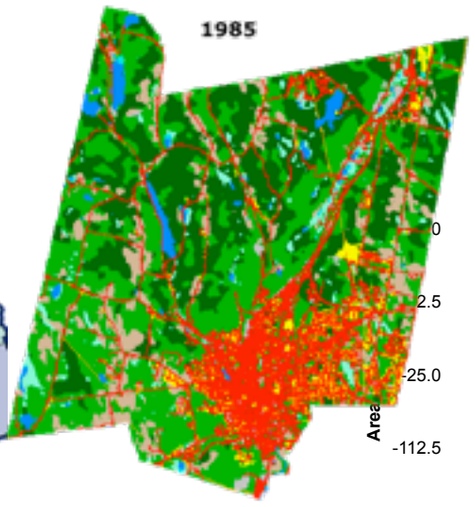
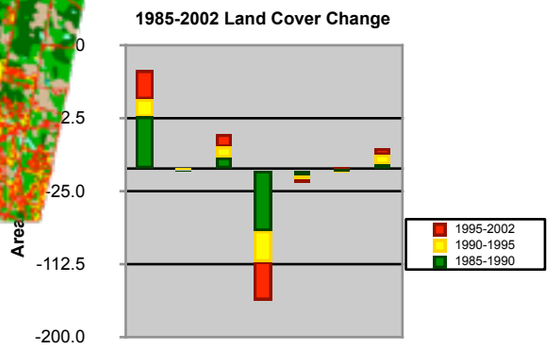


Accessible at multiple levels

The Simpson Scale



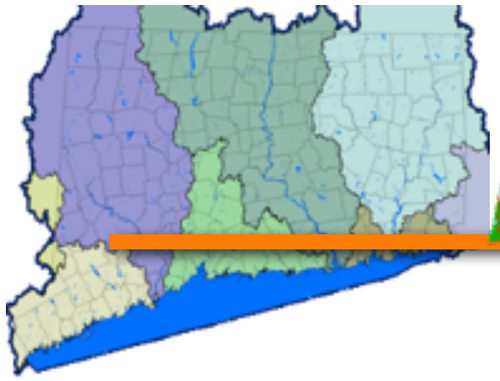


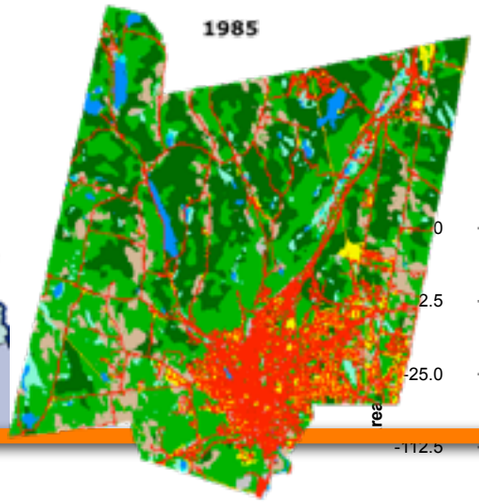


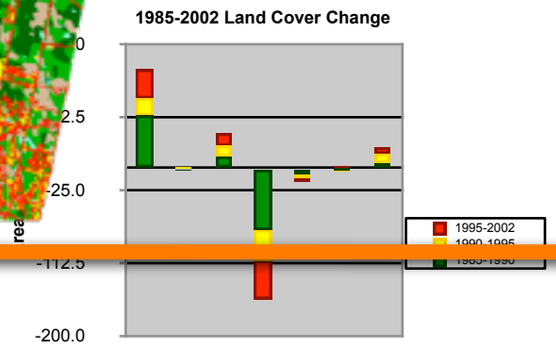
Class Description (1985 - 2002 Land Cover)	1985 Area (sq. miles)	2002 Area (sq. miles)	Change (sq. miles)	Percent Change
Developed	811	930	119.6	14.8%
Turf & Grass	223	223	-0.4	-0.2%
Other Grasses & Agriculture	555	598	42.1	7.6%
Deciduous Forest	2469	2327	-156.4	-6.3%
Coniferous Forest	462	446	-15.3	-3.4%
Water	164	151	-12.9	-7.9%
Non-forested Wetlands	12	23	11.7	101.1%
Forested Wetlands	187	174	-12.8	-6.8%
Tidal Wetlands	23	24	0.5	2.4%
Barren	35	61	25.5	72.2%
Utility Right-of-way	15	15	-0.4	-2.3%

Accessible at multiple levels

The Simpson Scale







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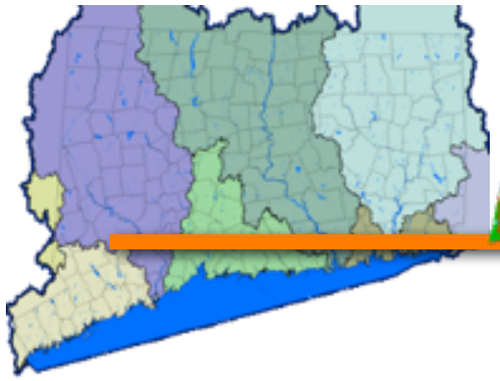

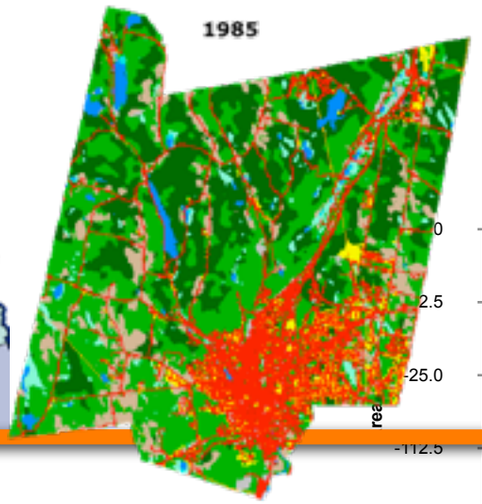

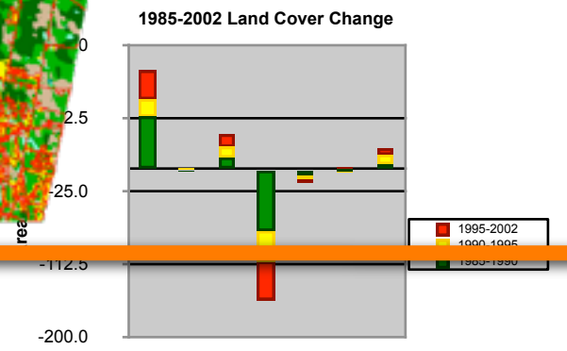

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2. Use the unique (and tailor-made) mission of Sea Grant to support all three legs of the decision support stool....

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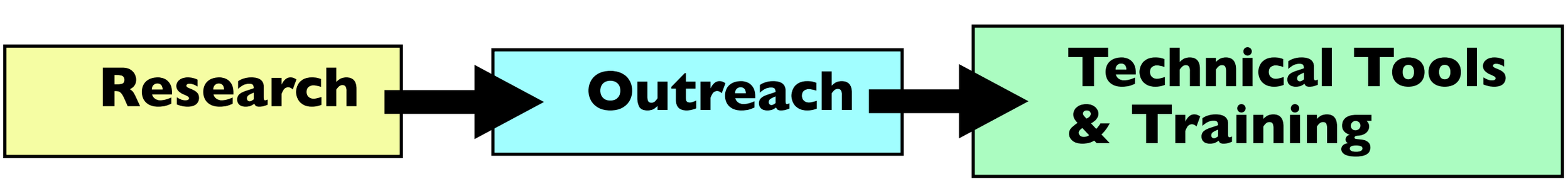


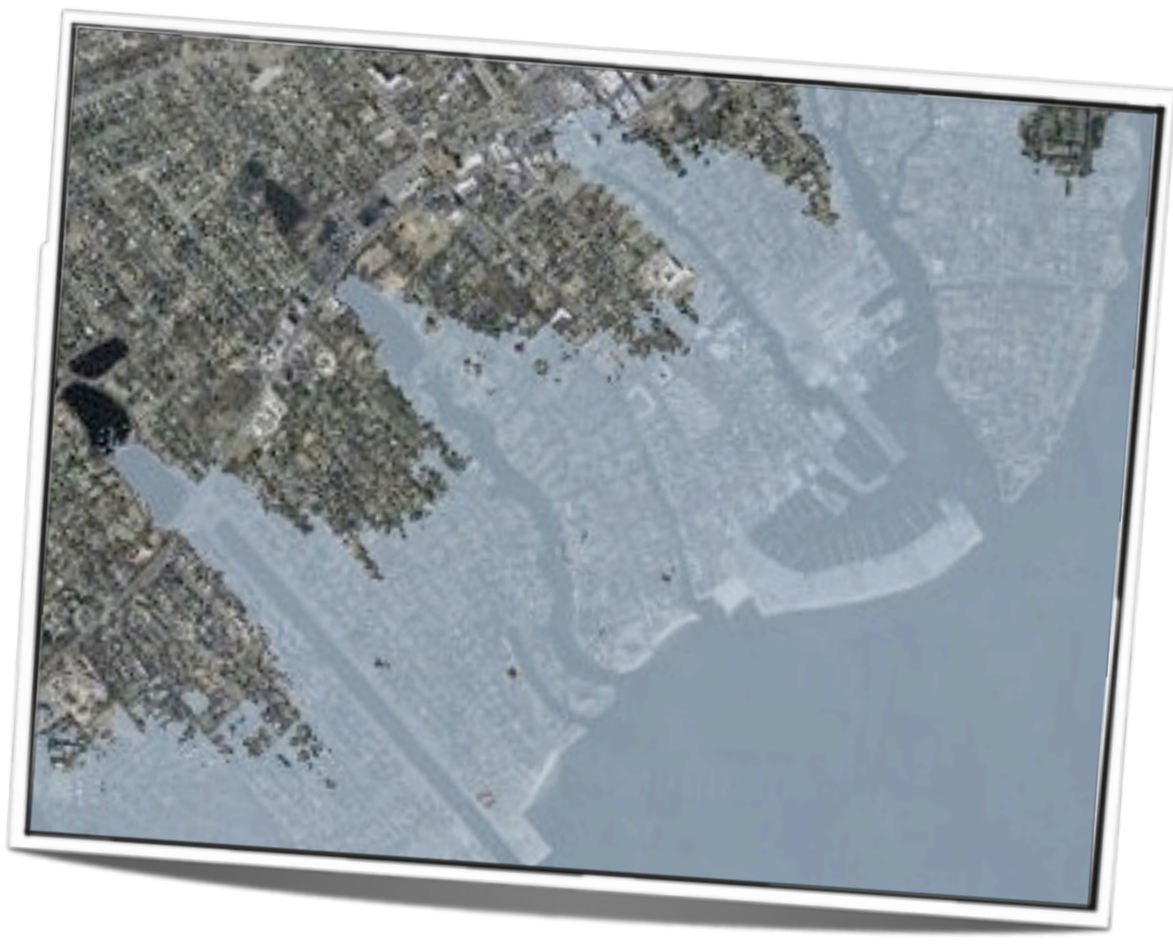
2. Use the unique (and tailor-made) mission of Sea Grant to support all three legs of the decision support stool....

2. Use the unique (and tailor-made) mission of Sea Grant to support all three legs of the decision support stool....

... but don't try to legislate integration

Two examples

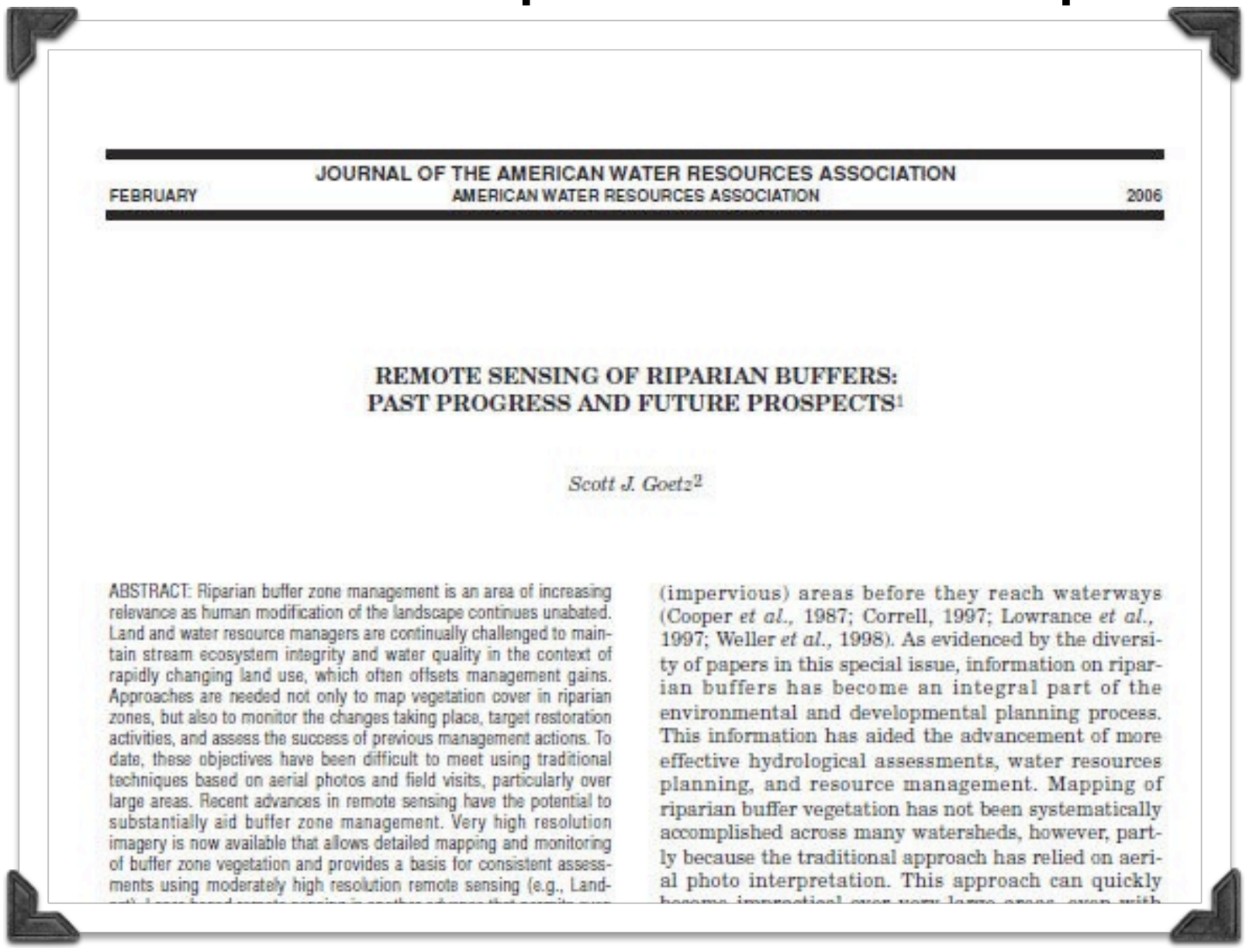
(don't ask me of what...)



Example 1: Riparian buffers & nitrogen input to coastal waters

Research:

- determine what's happening to riparian buffers
- determine what controls N process in the riparian zone



JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION
FEBRUARY AMERICAN WATER RESOURCES ASSOCIATION 2006

REMOTE SENSING OF RIPARIAN BUFFERS: PAST PROGRESS AND FUTURE PROSPECTS[1]

Scott J. Goetz[2]

ABSTRACT: Riparian buffer zone management is an area of increasing relevance as human modification of the landscape continues unabated. Land and water resource managers are continually challenged to maintain stream ecosystem integrity and water quality in the context of rapidly changing land use, which often offsets management gains. Approaches are needed not only to map vegetation cover in riparian zones, but also to monitor the changes taking place, target restoration activities, and assess the success of previous management actions. To date, these objectives have been difficult to meet using traditional techniques based on aerial photos and field visits, particularly over large areas. Recent advances in remote sensing have the potential to substantially aid buffer zone management. Very high resolution imagery is now available that allows detailed mapping and monitoring of buffer zone vegetation and provides a basis for consistent assessments using moderately high resolution remote sensing (e.g., Land-

(impervious) areas before they reach waterways (Cooper *et al.*, 1987; Correll, 1997; Lowrance *et al.*, 1997; Weller *et al.*, 1998). As evidenced by the diversity of papers in this special issue, information on riparian buffers has become an integral part of the environmental and developmental planning process. This information has aided the advancement of more effective hydrological assessments, water resources planning, and resource management. Mapping of riparian buffer vegetation has not been systematically accomplished across many watersheds, however, partly because the traditional approach has relied on aerial photo interpretation. This approach can quickly

Research:

- determine what's happening to riparian buffers
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JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION
VOL. 37, NO. 6 AMERICAN WATER RESOURCES ASSOCIATION DECEMBER 2001

LANDSCAPE ATTRIBUTES AS CONTROLS ON GROUND WATER NITRATE REMOVAL CAPACITY OF RIPARIAN ZONES[1]

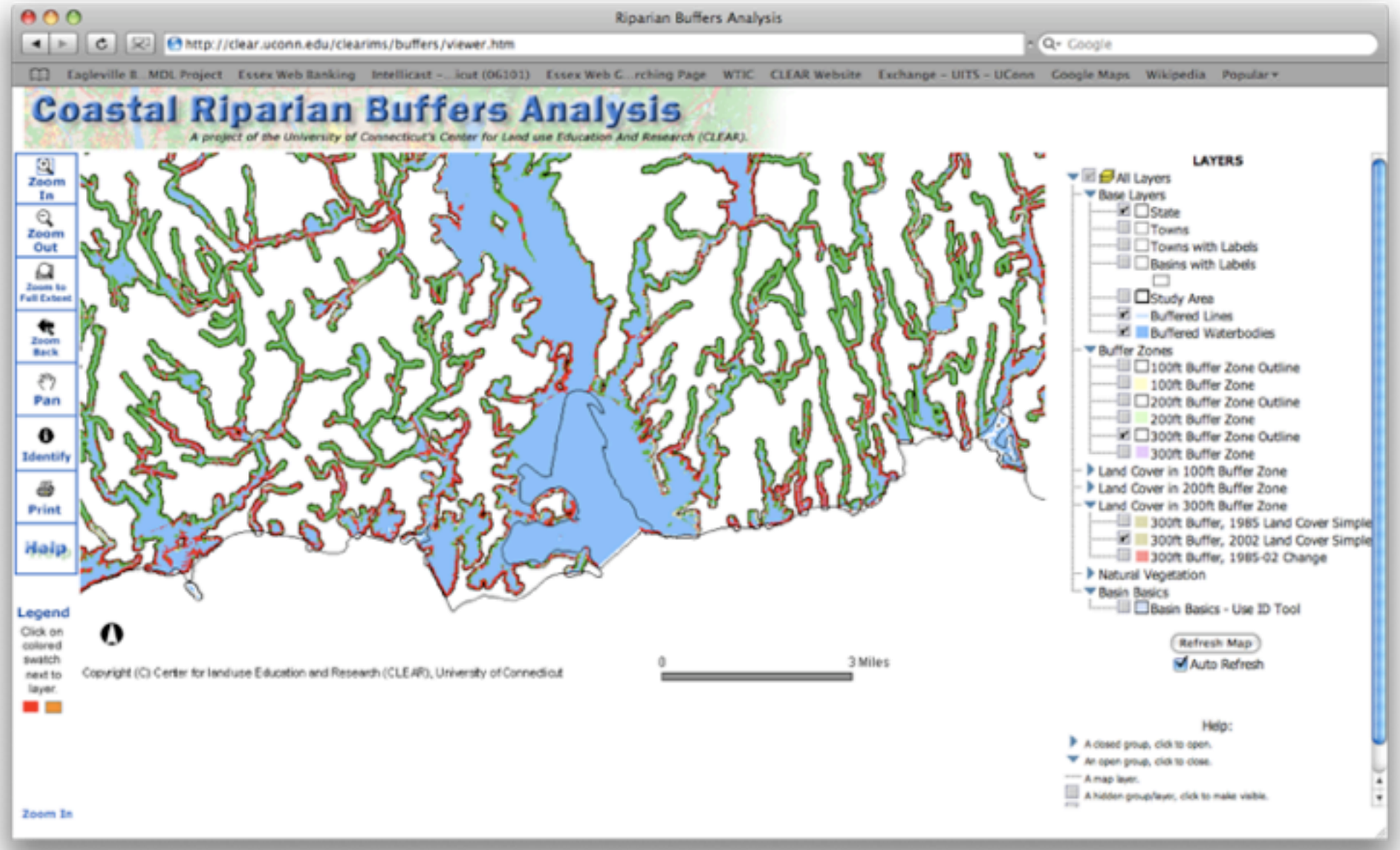
Arthur J. Gold, Peter M. Groffman, Kelly Addy, D. Q. Kellogg, Mark Stolt, and Adam E. Rosenblatt[2]

ABSTRACT: Inherent site factors can generate substantial variation in the ground water nitrate removal capacity of riparian zones. This paper examines research in the glaciated Northeast to relate variability in ground water nitrate removal to site attributes depicted in readily available spatial databases, such as SSURGO. Linking site-specific studies of riparian ground water nitrate removal to spatial data can help target high-value riparian locations for restoration or protection and improve the modeling of watershed nitrogen flux. Site attributes, such as hydric soil status (soil wetness) and geomorphology, affect the interaction of nitrate-enriched ground water with portions of the soil ecosystem possessing elevated biogeochemical transformation rates (i.e., biologically active zones). At our riparian sites, high ground water nitrate-N removal rates were restricted to hydric soils. Geomorphology provided insights into ground water flowpaths. Riparian sites located on outwash and organic/alluvial deposits have high potential for nitrate-enriched ground water to interact with biologically active zones. In till deposits, ground water nitrate removal capacity may be limited by the high occurrence of surface seeps that markedly reduce the time available for biological transformations to occur

(Rabalais *et al.*, 1996) to the Baltic Sea (Howarth *et al.*, 1996). Because nitrate is primarily transported to streams via ground water flow, biogeochemical transformations at the interface of streams and the land margin can have a large influence on the export of nitrate from watersheds (Hedin *et al.*, 1998; Lowrance, 1998). However, riparian zones display wide variation in their ground water nitrate removal capacity (Correll, 1997). Clearly, the age and species composition of the vegetated community will have profound effects on riparian nitrate dynamics (Haycock and Pinay, 1993; Osborne and Kovacic, 1993; Schultz *et al.*, 1995; Correll, 2000). However, the nitrate removal capacity of a riparian zone hinges on the interaction of nitrate-enriched ground water with components of the riparian zone that support removal processes, e.g., plant or microbial uptake or denitrifi-

Technical tools & training:

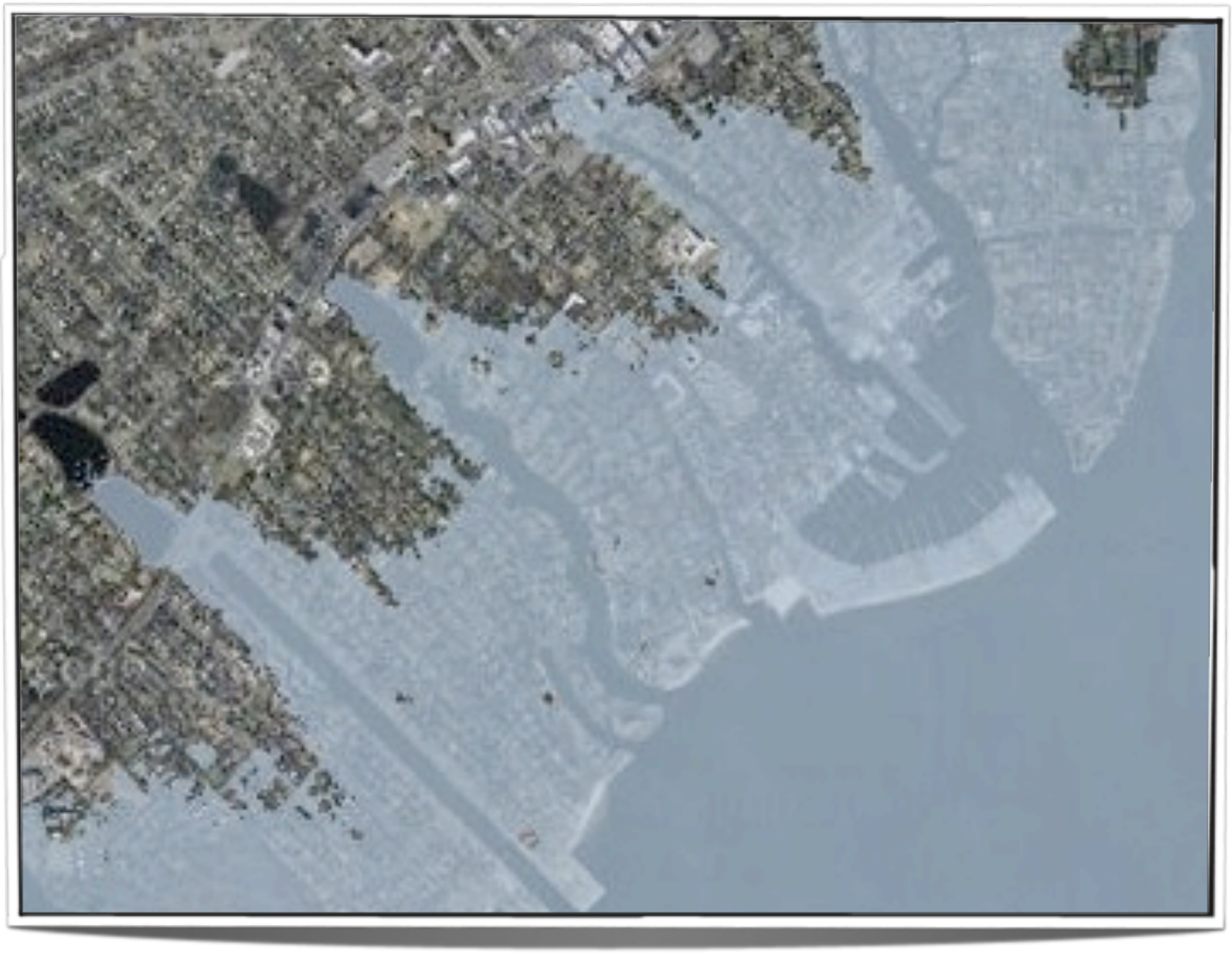
- construct tools to assess land cover and change in riparian zones (UConn & many, many others)
- construct tools to assess nitrogen-processing riparian zones (URI & UConn)



Outreach to Communities: *tbd*

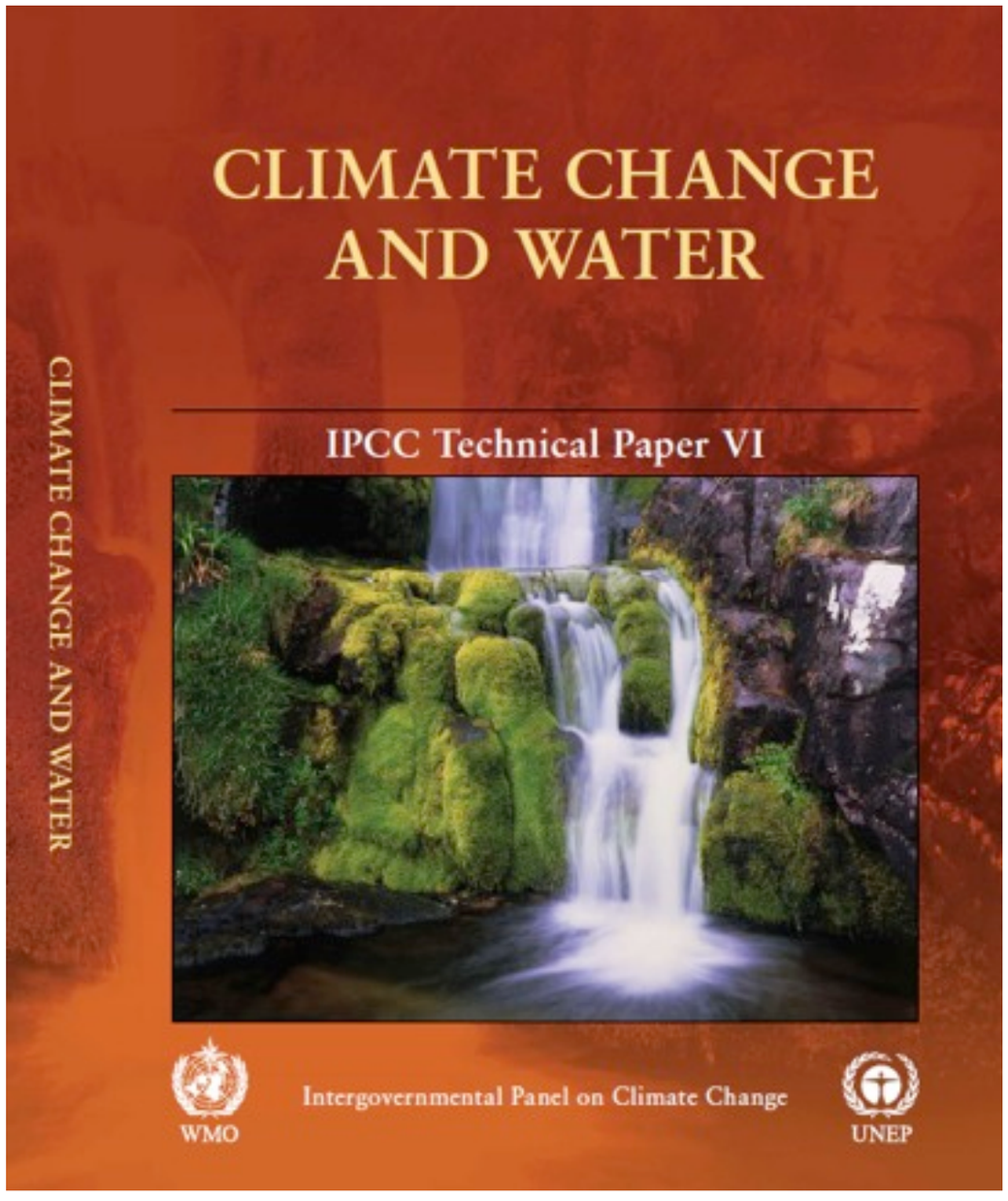
- Where do riparian buffers need to be protected?
- How wide do they need to be?
- What mechanisms do we use to protect them??

Example 2: Climate change-induced sea level rise



Research:

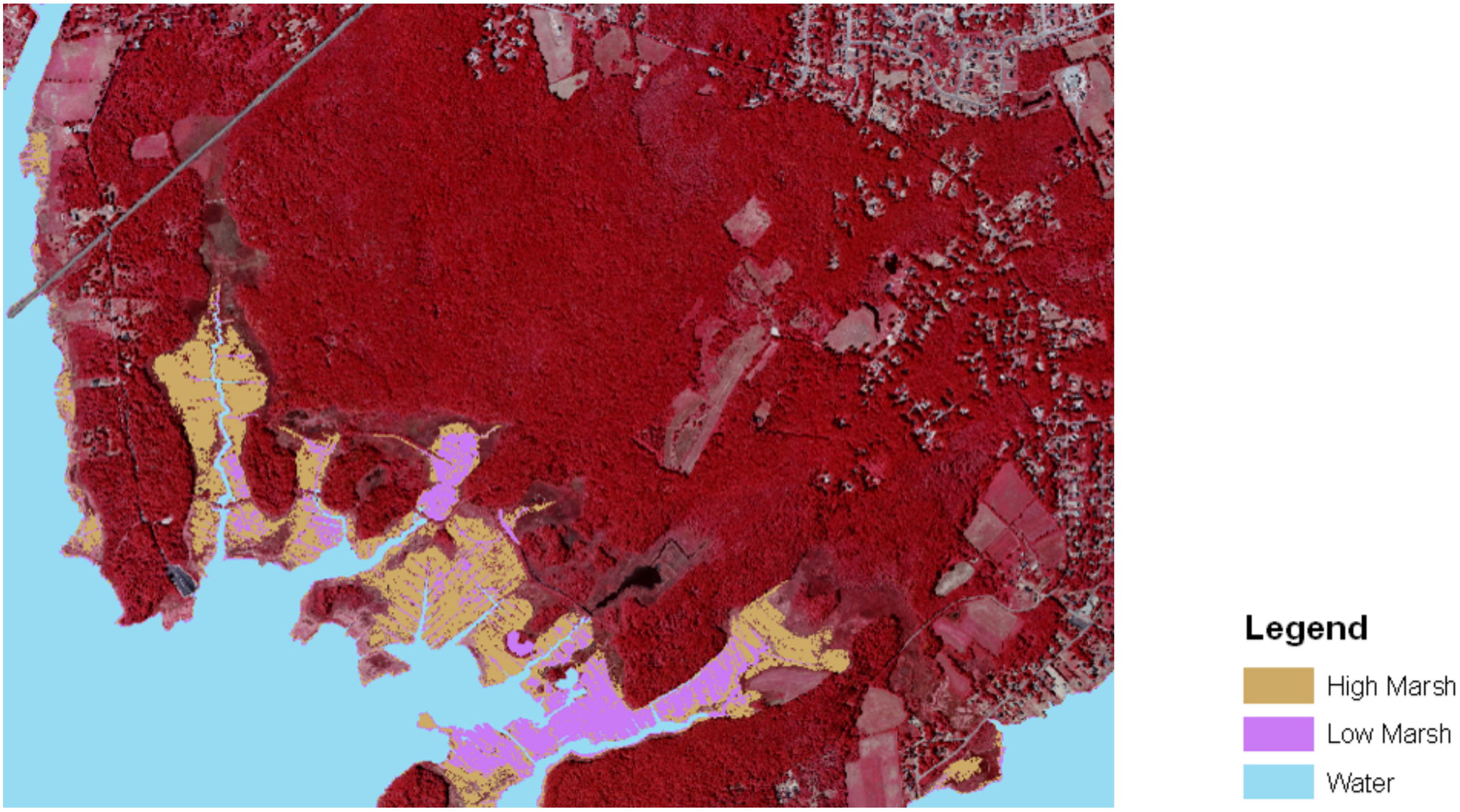
- determine rate & amount of climate change-related sea level rise and other natural resource impacts



Higher water temperatures and changes in extremes, including floods and droughts, are projected to affect water quality and exacerbate many forms of water pollution – from sediments, nutrients, dissolved organic carbon, pathogens, pesticides and salt, as well as thermal pollution, with possible negative impacts on ecosystems, human health, and water system reliability and operating costs (*high confidence*). In addition, sea-level rise is projected to extend areas of salinisation of groundwater and estuaries, resulting in a decrease of freshwater availability for humans and ecosystems in coastal areas.

Finer scale research:

- determine impact of climate change on coastal resources and/or community infrastructure



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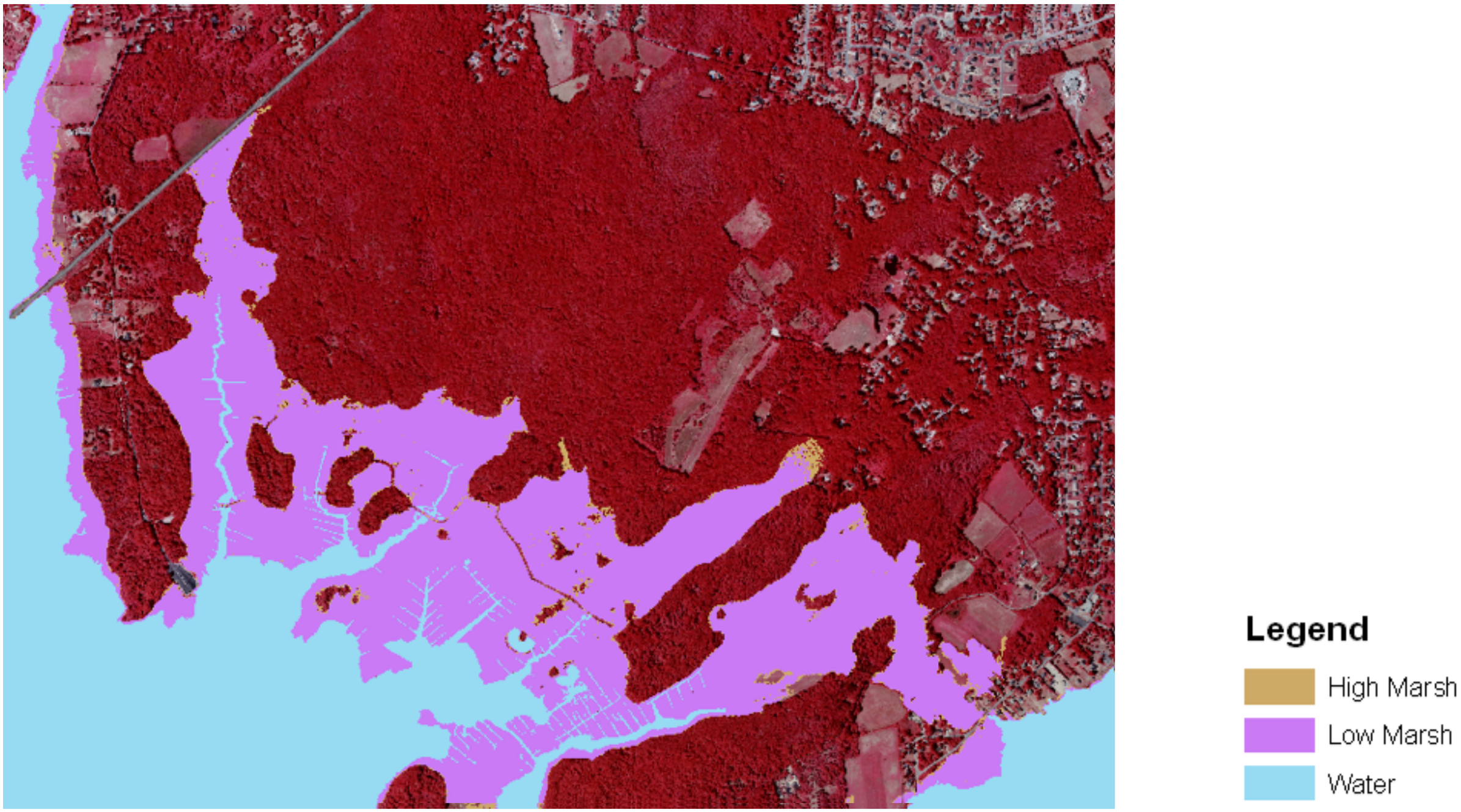

Technical tools & training:

- what will this sea level rise look like in specific localities, and what are the physical and economic impacts?

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National Oceanic and Atmospheric Administration
U.S. Department of Commerce

COASTAL RESILIENCE LONG ISLAND

Adapting Natural and Human Communities to Sea Level Rise and Coastal Hazards

Sea level rise and coastal hazards are putting human and natural communities along the coasts at greater risk than ever.

The Issue

Coastlines have always been dynamic ecosystems where tides, winds, and sediment movement combine to change the landscape. The impacts of sea level rise and storms will only get more intense because of increasing pace of change in climate and development of these shorelines. Because of sea level rise and increasing storm severity, human and natural communities near the shore are at greater risk than ever. The costs of coastal hazards to human and natural communities are growing as investments in coastal development increase. Coastal communities are at further risk as their natural buffers such as coastal wetlands and dunes are lost.

The Issue
Sea level rise, flooding and storms


Coastal Resilience: Disclosures
Coastal Resilience Project
COASTAL RESILIENCE LONG ISLAND
Adapting Natural and Human Communities to
Sea Level Rise and Coastal Hazards
Split View
Background
Flood Scenarios
Map Contents
Visible Layer Sorter
Perform Analysis
Layers
Results
Ecological
Socio-Economic
Layer
Age - Over 64
Age - Under 5
Below Poverty
Median Household Income
Population Distribution
Renter Occupied
Seasonal Units
Group: Response
Crticial Facilities
Group: Vulnerability
Critical Infrastructure and Facilities Index
Estimated Economic Exposure - Commercial
Estimated Economic Exposure - Residential
Overall Community Vulnerability Index
Social Vulnerability Index
Boundaries and Buffers
Colonial Springs Golf Club
North Babylon
Belmont Lake State Park
West Babylon
West Islip
Babylon
Lindenhurst
Bergen Point Golf Club
Bay Shore
Brightwaters
Southward Ho Golf Course
Islip
East Islip
Seatuck National Wildlife Refuge
Gardiner County Park
Oakdale
West Sayville
Timber Point Country Club
Great South Bay
Ocean Beach
Lonelyville
Saltaire
Fire Island Inlet
Robert Moses State Park
Cedar Beach Town Park
Oak Beach
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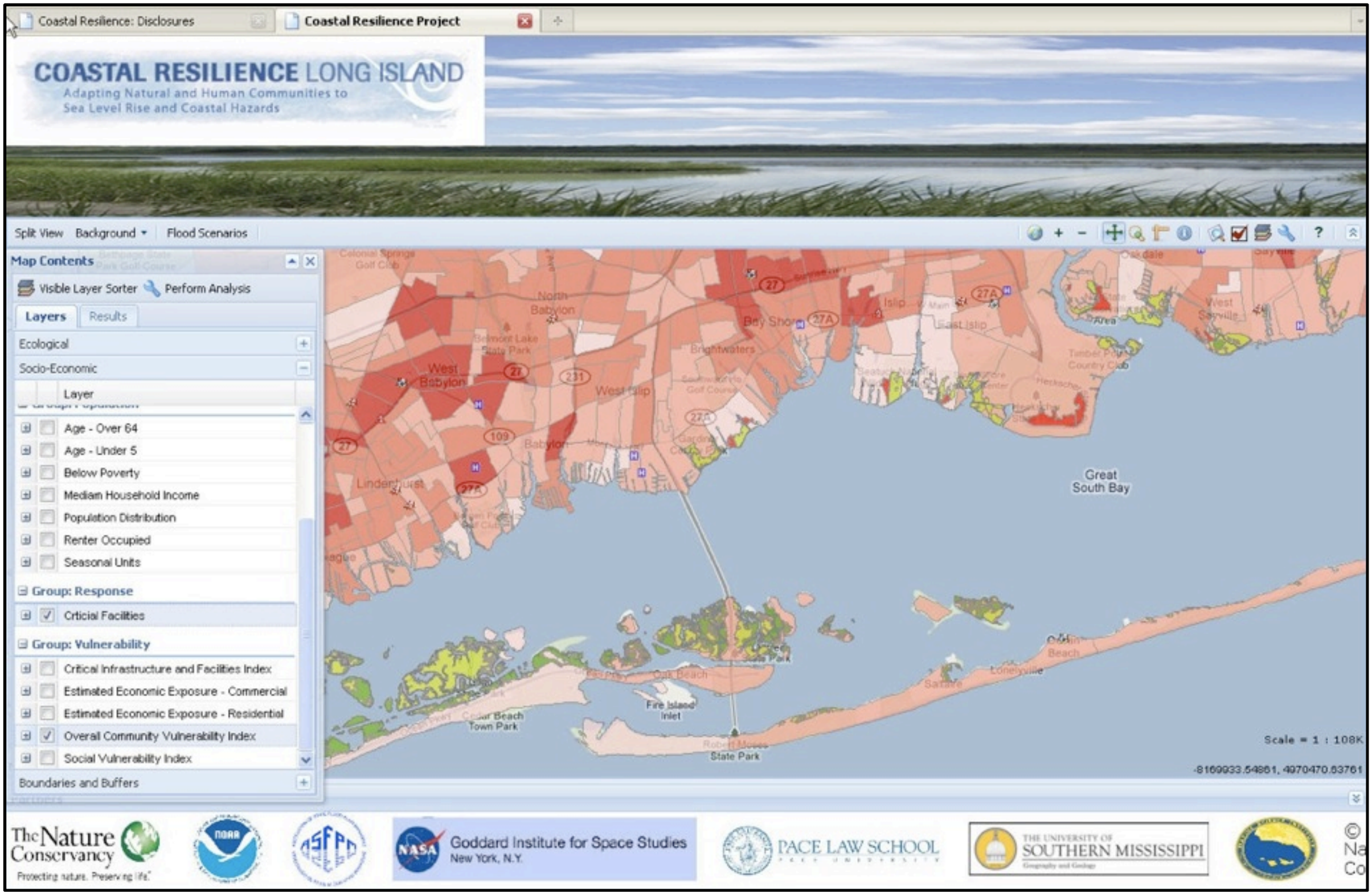
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West Babylon
Babylon
Lindenhurst
Bay Shore
Islip
East Islip
Brightwaters
West Islip
Great South Bay
Fire Island Inlet
Robert Moses State Park
Oak Beach
Cedar Beach Town Park
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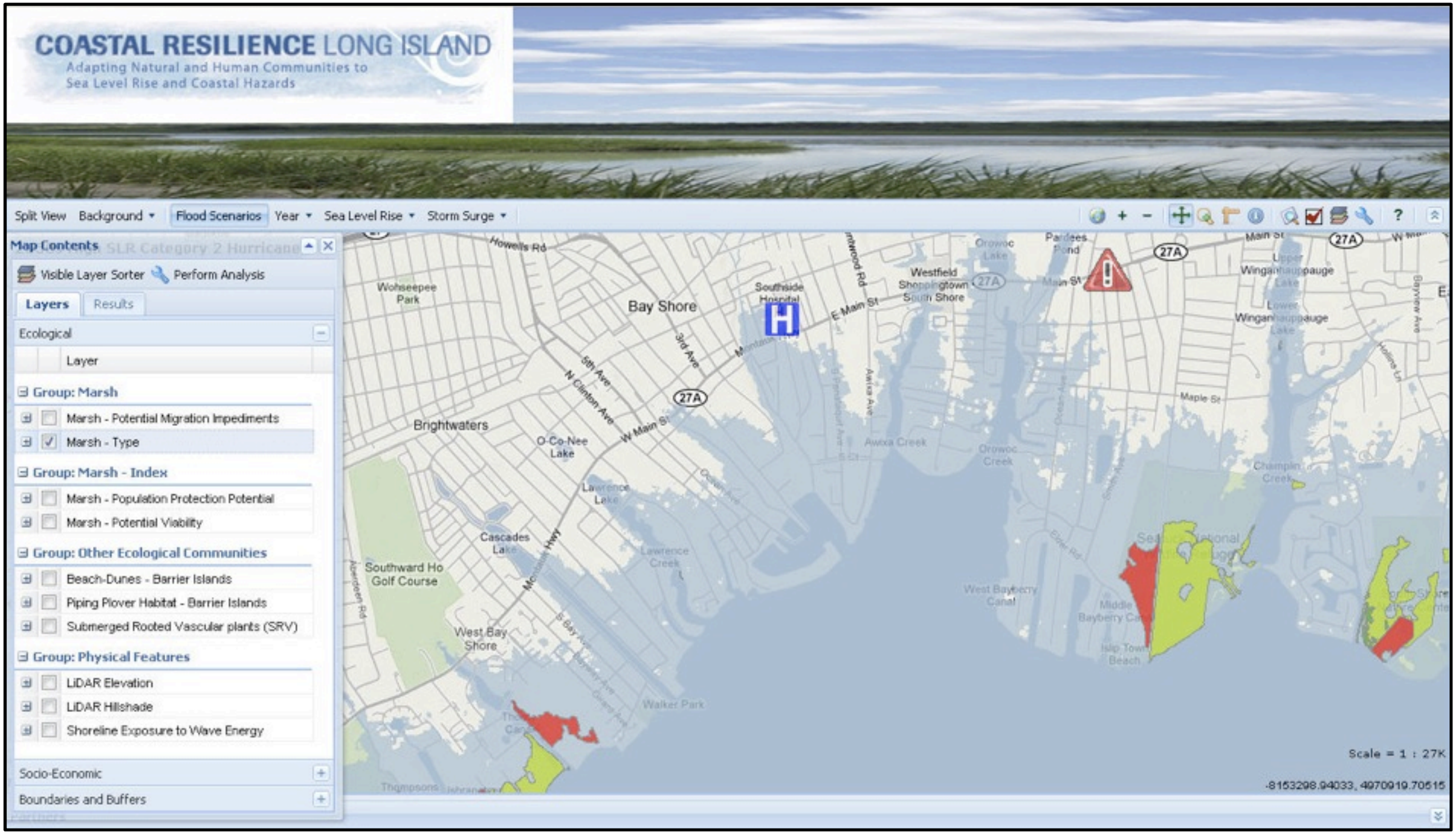
COASTAL RESILIENCE LONG ISLAND
Adapting Natural and Human Communities to
Sea Level Rise and Coastal Hazards
Split View
Background
Flood Scenarios
Year
Sea Level Rise
Storm Surge
Map Contents
Visible Layer Sorter
Perform Analysis
Layers
Results
Ecological
Layer
Group: Marsh
Marsh - Potential Migration Impediments
Marsh - Type
Group: Marsh - Index
Marsh - Population Protection Potential
Marsh - Potential Viability
Group: Other Ecological Communities
Beach-Dunes - Barrier Islands
Piping Plover Habitat - Barrier Islands
Submerged Rooted Vascular plants (SRV)
Group: Physical Features
LiDAR Elevation
LiDAR Hillshade
Shoreline Exposure to Wave Energy
Socio-Economic
Boundaries and Buffers
Bay Shore
Brightwaters
West Bay Shore
Southside Hospital
Westfield Shoppingtown South Shore
Wohseepee Park
O-Co-Nee Lake
Lawrence Lake
Cascades Lake
Southward Ho Golf Course
Howells Rd
E Main St
W Main St
Main St
Maple St
27A
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COASTAL RESILIENCE LONG ISLAND
Adapting Natural and Human Communities to
Sea Level Rise and Coastal Hazards
Single View
Background
Flood Scenarios
Year
Sea Level Rise
Storm Surge
View
2050s High SLR Category 2 Hurricane
Present
Wohseepee Park
Bay Shore
Southside Hospital
Westfield Shoppingtown South Shore
Orowoc Lake
Pardees Pond
Howells Rd
E Main St
Main St
27A
3rd Ave
5th Ave
N Clinton Ave
W Main St
Brightwaters
O-Co-Nee Lake
Awixa Creek
Orowoc Creek
Lawrence Lake
Lawrence Creek
Ocean Ave
Cascades Lake
Montauk Hwy
Southward Ho Golf Course
West Bay Shore
S Bay Ave
Bayway Ave
Gilgro Ave
Walker Park
West Baybery Canal
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Geography and Geology

Decision support/outreach: *tbd*

- what actions do coastal communities need to take to make them more adaptable to sea level rise?

Decision support/outreach: *tbd*

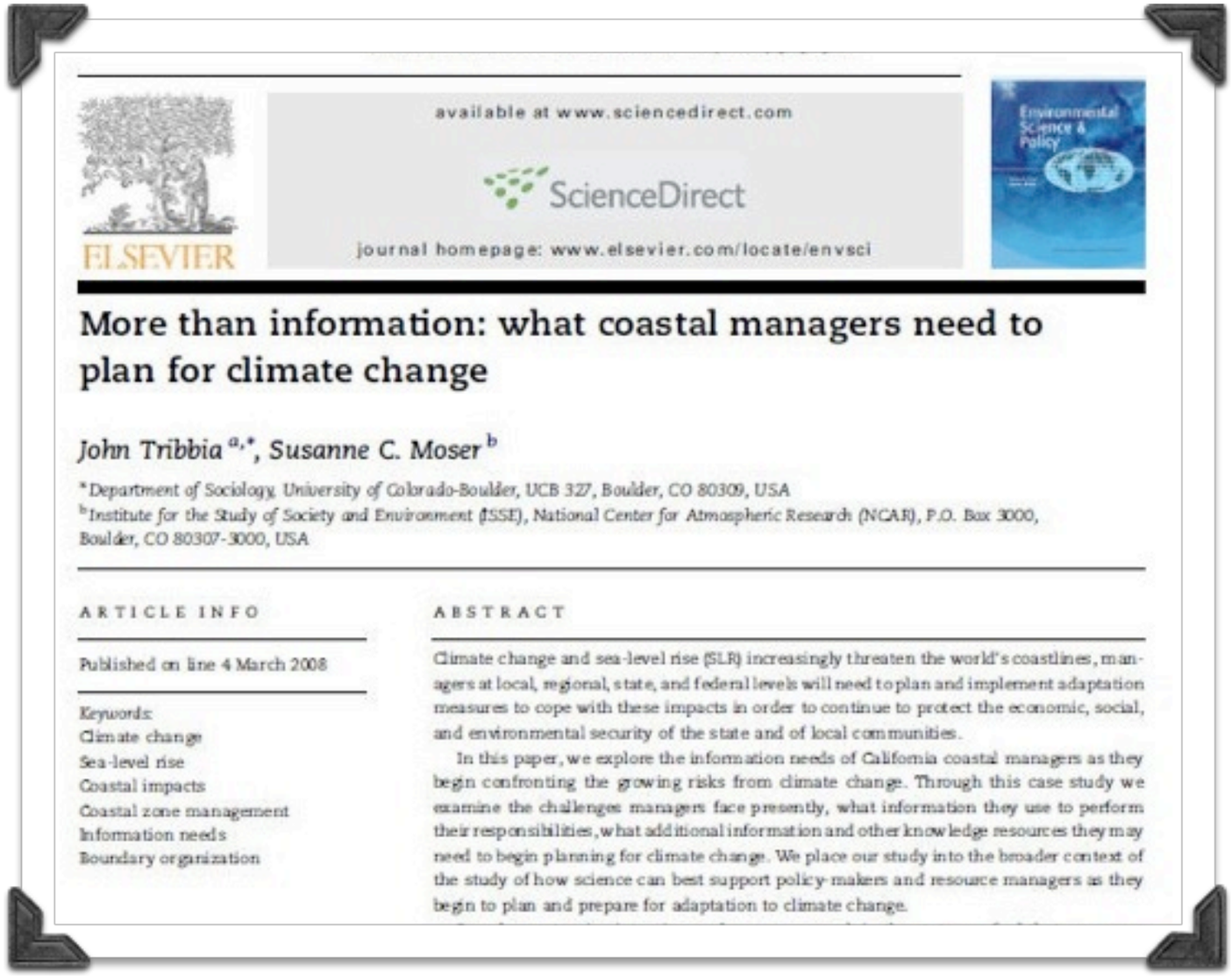
- what actions do coastal communities need to take to make them more adaptable to sea level rise?

Decision support/outreach: *tbd*

- what actions do coastal communities need to take to make them more adaptable to sea level rise?

- Stormwater management
- infrastructure planning
- overlay zones
- open space protection
- building codes
- and much more...

"This study illustrates the strong need for boundary organizations to serve various intermediary functions between science and practice, especially in the context of adaptation to global climate change impacts."



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More than information: what coastal managers need to plan for climate change

John Tribbia [a,*], *Susanne C. Moser* [b]

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ARTICLE INFO

Published on line 4 March 2008

Keywords:
Climate change
Sea-level rise
Coastal impacts
Coastal zone management
Information needs
Boundary organization

ABSTRACT

Climate change and sea-level rise (SLR) increasingly threaten the world's coastlines, managers at local, regional, state, and federal levels will need to plan and implement adaptation measures to cope with these impacts in order to continue to protect the economic, social, and environmental security of the state and of local communities.

In this paper, we explore the information needs of California coastal managers as they begin confronting the growing risks from climate change. Through this case study we examine the challenges managers face presently, what information they use to perform their responsibilities, what additional information and other knowledge resources they may need to begin planning for climate change. We place our study into the broader context of the study of how science can best support policy-makers and resource managers as they begin to plan and prepare for adaptation to climate change.

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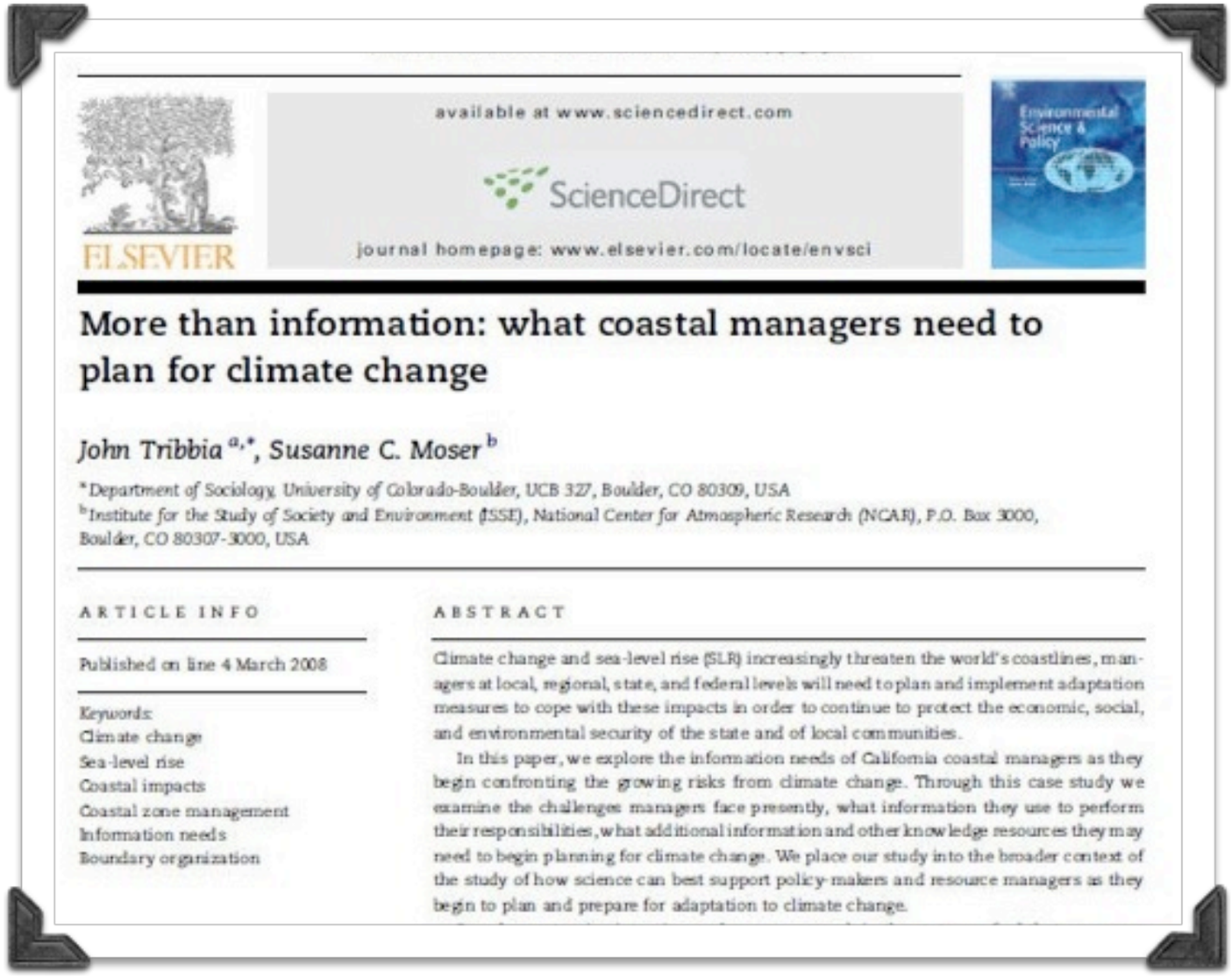

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Sea Grant

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TOOL:

anything used as a means of accomplishing a task or purpose

TOOL:

anything used as a means of accomplishing a task or purpose

Support tools-related projects that

- ✓ create the data and understanding to fuel them
- ✓ show the creativity to adapt and apply them
- ✓ recognize the need to integrate them with outreach
- ✓ leverage their results

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Working with communities is not easy, and a support system helps.

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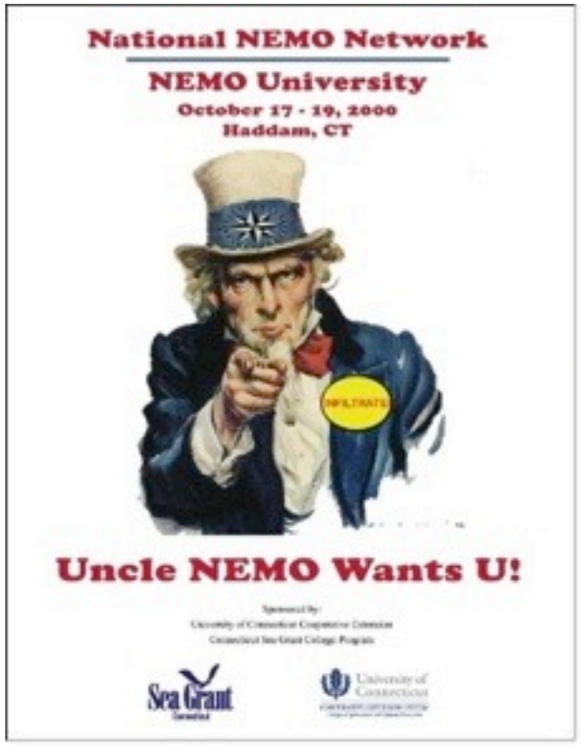
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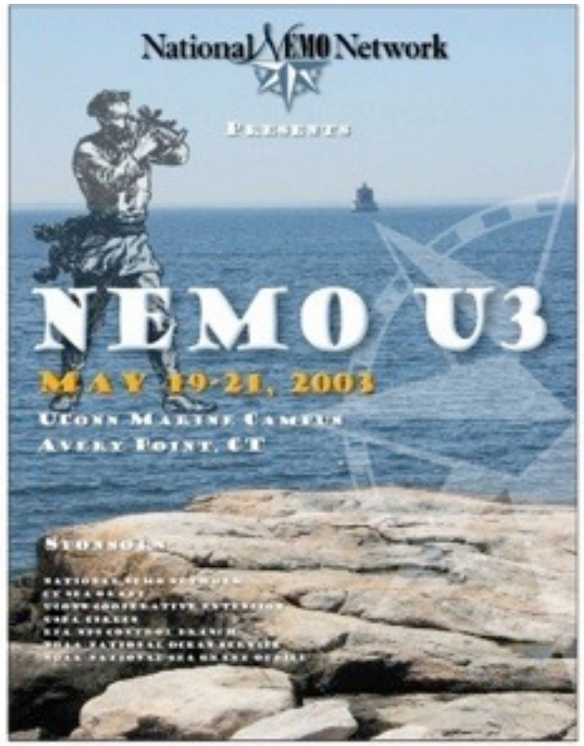
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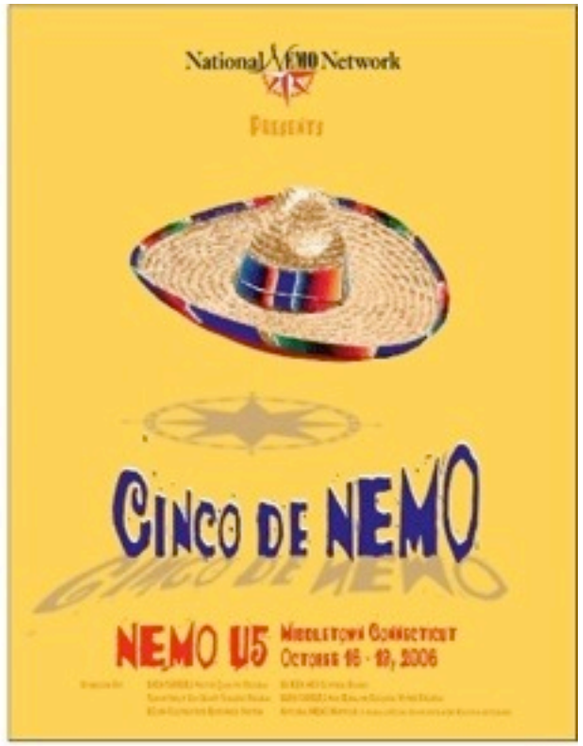
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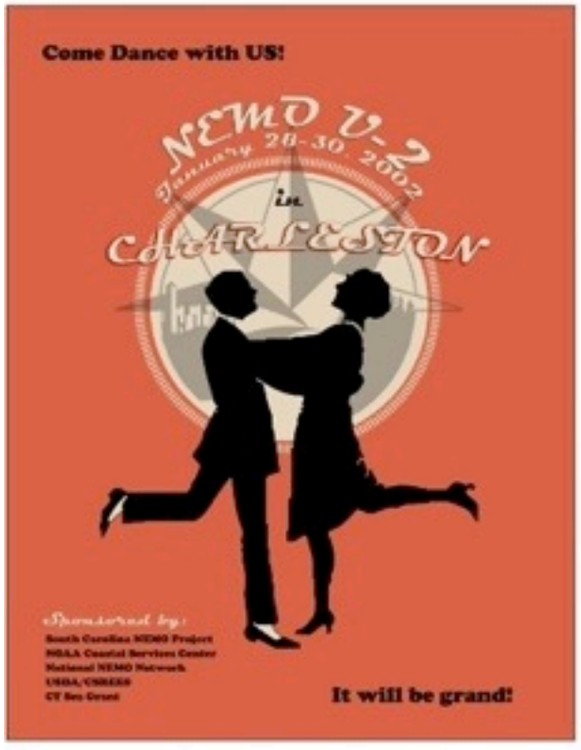
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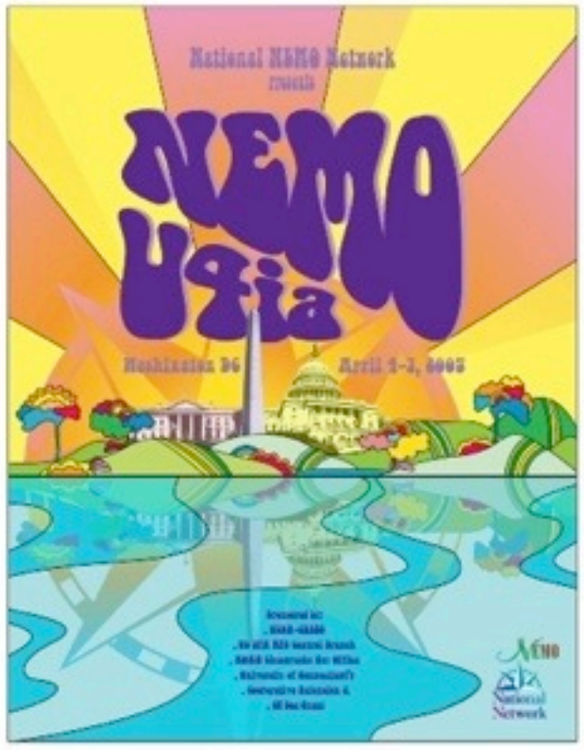
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